TECHNOLOGY DEPT.

THE FOUNDRY

December, 1946

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1946
DETROIT

wherever metals are cast...

PHILO RAINIER

Ohio Ferro-Alloys Corporation
Canton Ohio

To Producers of
Iron and Steel

Despite many difficulties, we have extended every effort to be of real service to the industry during 1946.

Your appreciation of our efforts, as evidenced by your confidence and understanding, is gratifying.

We trust the future will enable us to be of even greater service.

, President

FERRO-SILICON
50% - 75% - 85% - 95%
SPECIAL BLOCKING
50% FERRO-SILICON
FERRO-CHROMIUM
FERRO-MANGANESE
BOROSIL SIMANAL
• *Briquets* •
SILICON, CHROME
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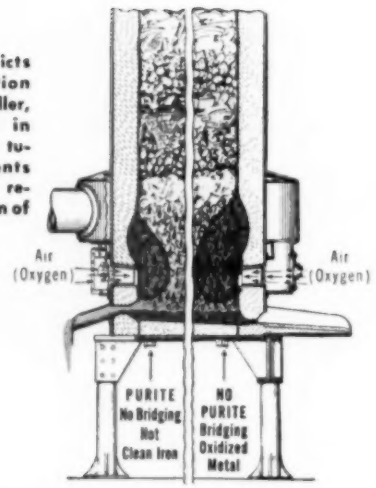
Ohio Ferro-Alloys Corporation
Canton, Ohio

CHICAGO DETROIT PITTSBURGH SAN FRANCISCO TACO

SPEED PRODUCTION OF SOUNDER CASTINGS

PURITE restricts the combustion zone to a smaller, hotter area in front of the tuyeres, prevents bridging and reduces oxidation of the metal.



Purite is used with limestone in the ratio of 1 part Purite to 10 parts stone on the bed coke and 1 part to 20—40 parts stone on regular coke charges.

To insure sounder, better machining castings, use Purite

Refining with Purite, whether in the cupola or in a mixer ladle, purges the molten metal of oxides and silicates which produce sluggish iron, shrinkage and segregation defects.

Purite pays dividends in better cupola operations and cleaner stronger castings.

Can you afford to overlook this means of improving your competitive position in the castings industry.

THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

PURITE

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

In Canada: Railway & Power Engineering Corporation, Limited

Omega has "Sock"

It's a steel that's made to give—and take—hard knocks.

This property results from a special composition that imparts high shock-resisting qualities. That's why Omega is used so widely in chipping chisels.

Whether you form your own chisels or buy them ready for use, be sure they're made of Omega. You'll find it a wise choice of steel—one that pays off in cleaner, faster chipping.

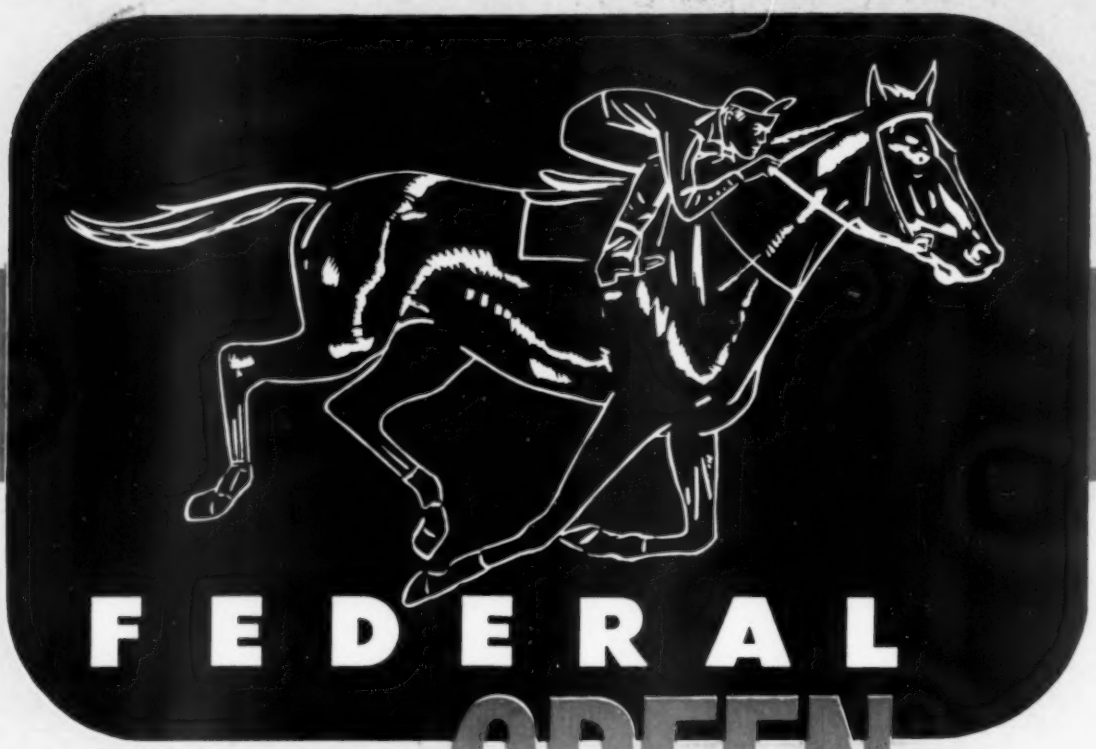
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

OMEGA... one of Bethlehem's BIG 8 Tool Steels

NO OTHER ENTRY CAN BEAT IT



FEDERAL GREEN BOND

The wide acceptance of FEDERAL GREEN BOND is a seal of approval by the foundry industry.

FEDERAL GREEN BOND controls sand strength. FEDERAL GREEN BOND is uniform. Your mix, once established, never changes.

Dependability and uniformity, therefore, are the prime qualities of FEDERAL GREEN BOND.

The Best of the Bentonites

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • UPTON, WYO. Mines

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Pacific Graphite Works, Oakland, Calif. • LaGrand Industrial Supply Co., Portland, Ore.
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for DECEMBER 1946

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Schroeder ★ OF WASHBURNE ON

He recommends Linoil

★Washburne Trade School is operated by the Board of education of the City of Chicago.

"Linoil cores make excellent castings where the stack core mold method is used. It is a fine dependable oil and there is nothing I would rather use in demonstrating foundry problems in my classes. I knew Linoil long before I became instructor at Washburne and I have always regarded it as the highest standard of core oil."

Roy W. Schroeder

THE WERNER

(DIVISION OF ARCHER

2191 WEST 110 STREET WOODBINE

STACK CORE MOLDS

Mr. Roy W. Schroeder, instructor of Foundry Practice at the Washburne Trade School, Chicago, is shown explaining to Smith-Hughes machinist students the advantages of stacked core molds over green sand molds. He says:

"Three to ten times more production may be had from the same floor space.

"Less skilled labor can do more of the work.

"Less sand to handle and to clutter the floor.

*"Castings made in core molds have a chance to anneal themselves and to get rid of the hard surface.

"Castings are of finer grain and with more uniform structure, than green sand castings.

"Machining is much easier, faster and less wearing on tools.

"Less machining because castings can be cast more closely to finished dimensions.

"Castings more uniform in size.

"Can be more easily and rapidly cleaned than green sand castings.

"Core mold castings are smoother and more attractive to customers."

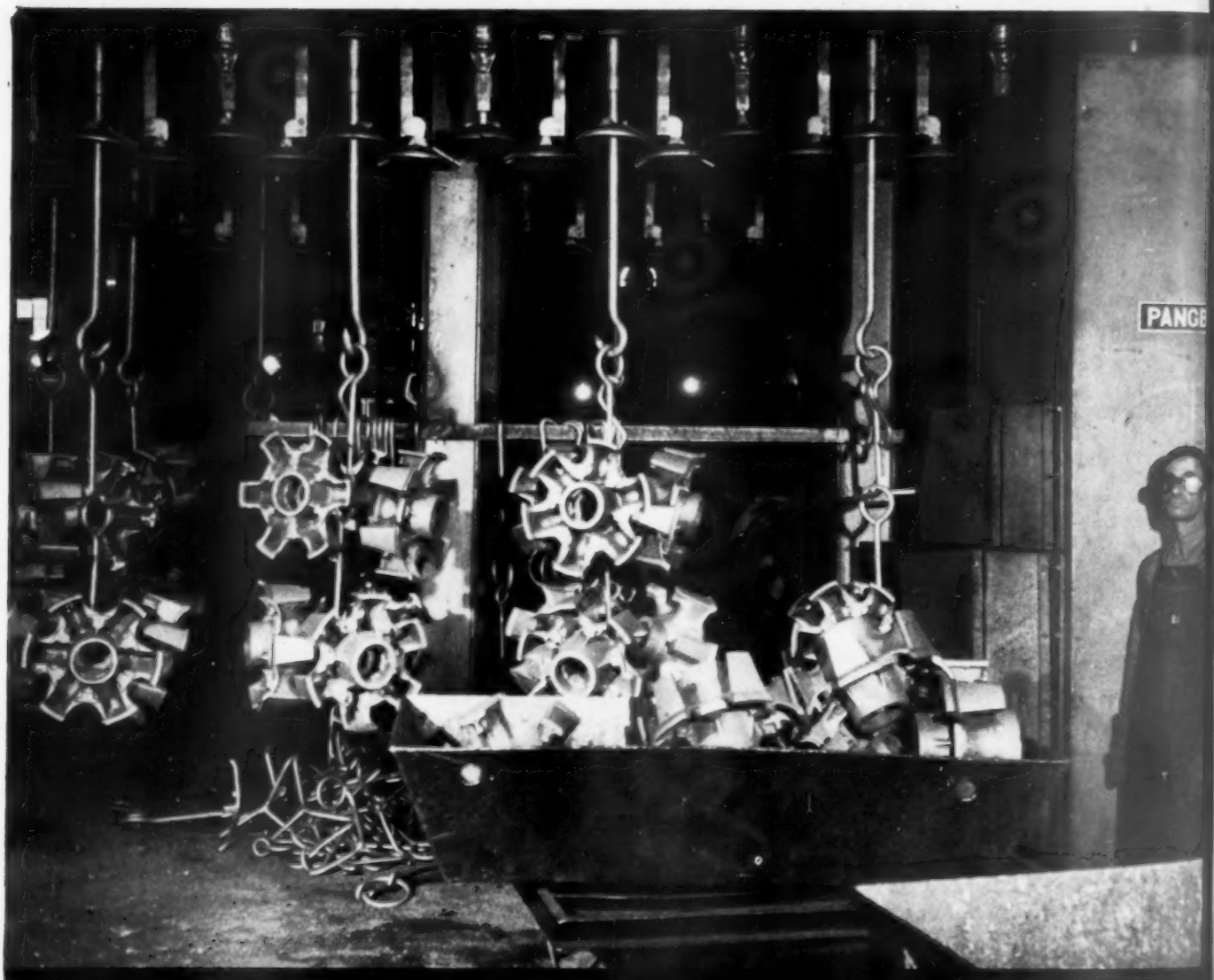
LINOIL

* We asked Mr. Schroeder to amplify some of the points he makes in this summary, particularly the one about annealing. He very kindly prepared a 5-page report of his research, with much interesting data. We will be glad to send you a photostat copy of Mr. Schroeder's excellent letter on request.

SMITH COMPANY
DANIELS-MIDLAND COMPANY)
CLEVELAND 2, OHIO

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND



Rotoblast

The airless centrifugal unit that propels metal abrasive without crushing, without waste

TORRENTS OF METAL "RAIN" wash out a costly bottleneck

600 TRUCK WHEEL CASTINGS CLEANED PER 8-HOUR DAY!

In a large steel foundry in Ohio, a Pangborn Special ROTOBLAST* Machine speeded up and improved the quality of cleaning to such an extent that the cleaning department—once a bottleneck—is now way ahead of grinding and finishing.

In its first day of operation, a "mountain" of castings that had been growing steadily was reduced to a molehill—and the cleaning department was three days ahead!

Better Cleaning — Easier

Castings are blast cleaned in the green stage before annealing—which means they go through the ROTOBLAST machine twice. The first blasting removes burned-in sand before the annealing process has a chance to cover it with heavy scale. Also permits faster and more economical removal of gates and risers. The second blasting—after annealing—removes heavy scale and produces a high luster finish in much less time than would otherwise be possible.

Here are some samples of ROTOBLAST performance—evidence of the higher production provided by this airless blast cleaning system which uses streams of metal abrasive under centrifugal force to do the cleaning.

Truck wheel castings: green, with risers, nearly 200 pounds each. ROTOBLASTing time: one minute (that's as fast as they can be loaded). After annealing, ROTOBLASTing time: four minutes for a high luster finish.

Road machine wheel castings: green, with risers, weighing up to 485 pounds (average load per hook: 1800 pounds). ROTOBLASTing time: one minute, fifteen seconds. After annealing, ROTOBLASTing time: three minutes for a high luster finish.

Miscellaneous castings up to 4700 pounds. ROTOBLASTing time: four minutes.

For complete information on how the ROTOBLAST method (utilized in special machines, tables, barrels) can improve *your* cleaning—by saving time, producing cleaner metal, facilitating inspection and finishing—write to Pangborn, *world's largest manufacturer of blast cleaning and dust control equipment*. Pangborn Corporation, 1300 Pangborn Boulevard, Hagerstown, Maryland.

*Trademark of the Pangborn Corporation

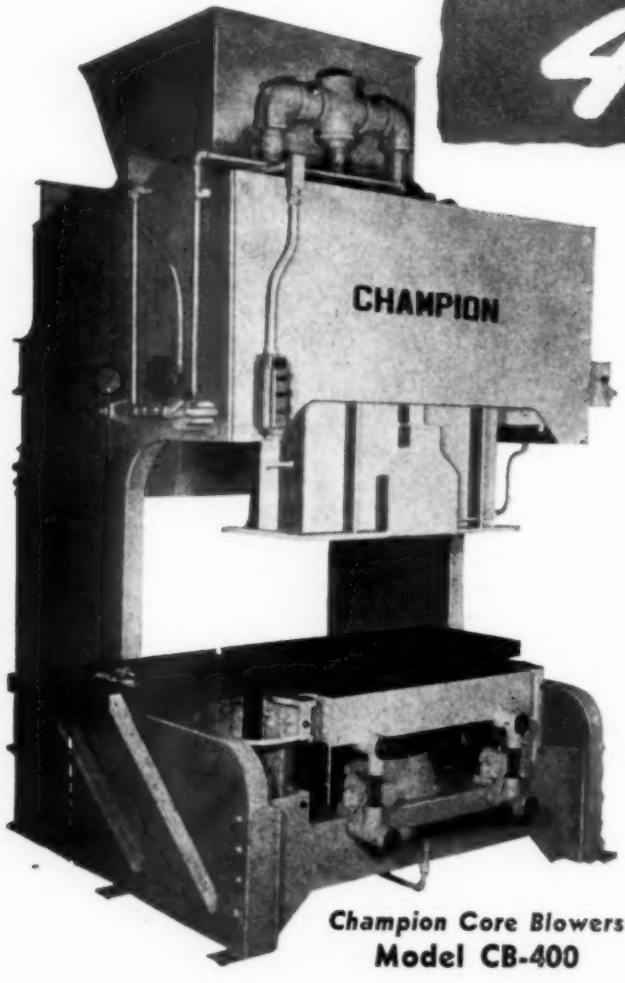
Illustration at right: 600 PER 8-HOUR DAY! Six truck wheel castings are placed on hook and carried by monorail into blasting chamber. Castings pass through the blast streams of four strategically-placed ROTOBLAST wheels, the monorail halting and the hook revolving the work in front of the blast stream.

RECONVERSION MEANS KEENER COMPETITION

AND . . . . . .

DO YOU KNOW HOW TO MEET IT!

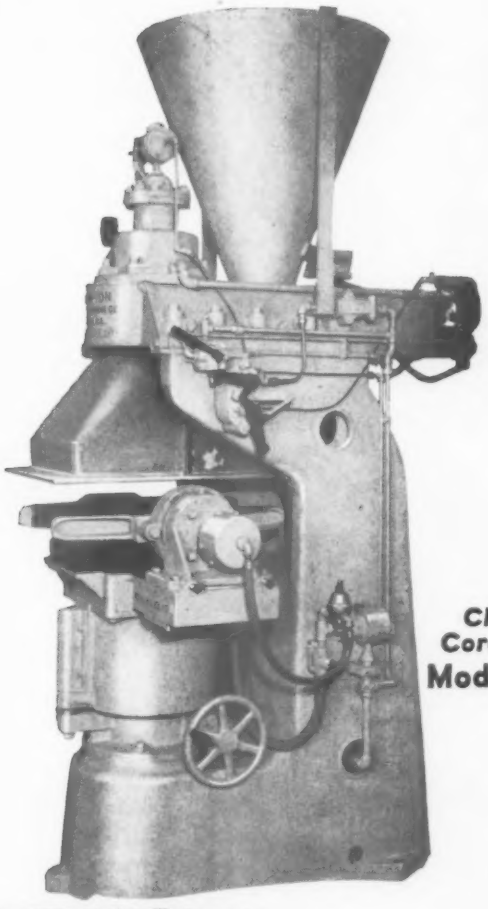
4 GREAT



Champion Core Blowers
Model CB-400

Champion Core Blowers
Model CB-10

Champion Core Blowers
Model CB-12



Champion
Core Blowers
Model CB-15

CHAMPIONS
MEET THE CHALLENGE

These four great *Champions* are True-Blue Ribbon winners—*Champions* every inch and every pound of them, backed by almost a half century of foundry "know-how." That's why we at *Champion* can guarantee complete satisfaction from every installation. Each model has been tried and proved in many of the world's leading foundries, small and large.

By simply setting the box and pulling the lever, any person without previous experience can produce perfectly rammed cores on a *Champion*. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamp in the proper cycle. Regardless of size or design —small or large, simple or complex cores —the ramming time is identical.

When keener competition comes, stay with the winner, who'll still be *Champion*.

CHAMPION
FOUNDRY & MACHINE CO.

1318 WEST 21st STREET CHICAGO 8, ILLINOIS

Here's a low cost binder you can buy RIGHT NOW!

DELTA BONDITE

A NEW ORGANIC BINDER FOR SKIN DRY, DRY SAND AND GREEN SAND MOLDS AND CORES

NOTE THESE IMPORTANT ADVANTAGES

1. Removal of water by heat produces good tensile strength, very high compression and low hot strength.
2. To produce the above properties, no chemical reaction takes place thus resulting in stable sand surfaces on which the molten metal lays kindly.
3. The volatile gases produced by decomposition of Bondite, ahead of the molten metal are reducing in nature. This helps neutralize free hydrogen, reduces oxidation, eliminates rough casting surfaces, burning-in and metal penetration.
4. Increased dry strength reduces buckling, scabbing, penetration and veining.
5. Prevents surface moisture absorption, becomes waterproof on drying.
6. Withstands high torch heat, will not crumble edges of skin dried molds.
7. It is 98% volatile, leaves no excessive ash for sand contamination.
8. Clays, Bentonite, silica flour, fines or old sand have a minor effect on its binding properties.
9. It is economical to use, reduces cleaning costs and greatly improves casting surfaces and soundness.
10. Covered by U. S. Patent No. 2256832 for foundry use.

BONDITE is a superior quality waterproof binder... immediately available in any quantity... and costs considerably less to use.

Ask for a working sample for test purposes and prove its superior qualities in your own foundry applications.

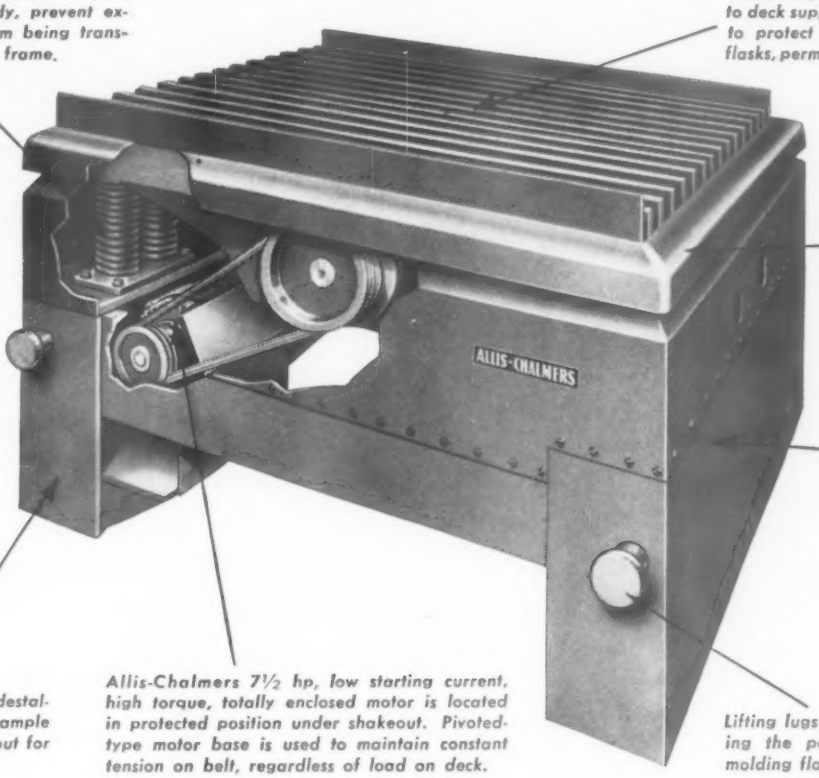
Complete data and specifications on DELTA BONDITE are contained in a recently prepared bulletin. A copy will be mailed to you on request.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF FOUNDRY PRODUCTS, INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS

MILWAUKEE 9, WISCONSIN

New Portable Shakeout To Aid Jobbing Foundries



Resilient support springs, 4 at each end of shakeout body, prevent excessive vibrations from being transmitted to supporting frame.

Heavy longitudinal skid bars welded to deck support frame are designed to protect frame, take impact of flasks, permit free discharge of sand.

Heavy reinforced sand deflector plate is welded directly to vibrating body.

Flat steel sand guard and support frame has no projecting structural members . . . protects V-belt drive, motor and mechanism. Opening in sand guard provided for inspection and lubrication.

Heavily designed pedestal-type frame allows ample space beneath shakeout for sand storage.

Allis-Chalmers 7½ hp, low starting current, high torque, totally enclosed motor is located in protected position under shakeout. Pivoted-type motor base is used to maintain constant tension on belt, regardless of load on deck.

Lifting lugs are employed for moving the portable unit from one molding floor to another by crane.

MILWAUKEE, WIS. — A 4′ x 6′ portable shakeout, for use in the foundry industry, is now offered by Allis-Chalmers. This newest addition to A-C's line of 2-bearing "Foundromatic" shakeouts makes possible quick, easy handling of average size flasks and castings.

The 4-ton capacity portable shakeout unit is equipped with lifting lugs for moving from one molding floor to another by crane. Totally enclosed motor is mounted underneath the 4′x6′ deck, out of the way. Pedestals allow plenty of room beneath the unit for sand storage.

Simple, 2-bearing construction on the new shakeout lowers operating and maintenance costs! Since flasks are uniformly vibrated, flask life is greatly increased. The high speed unit shakes out sand in *seconds*.

A-C now offers 8 sizes of 2-bearing shakeouts, to handle up to 25 tons.

Other Allis-Chalmers equipment to help save time and money in your foundry: Screens, Crushers, Blowers, Arc Furnace Substations, Kilns, Sand Conditioning equipment, Motors, Starters, Texrope Drives, Pumps.

For complete details, contact our nearby sales office, or write to ALLIS-CHALMERS, MILWAUKEE, WISCONSIN.

A 2056

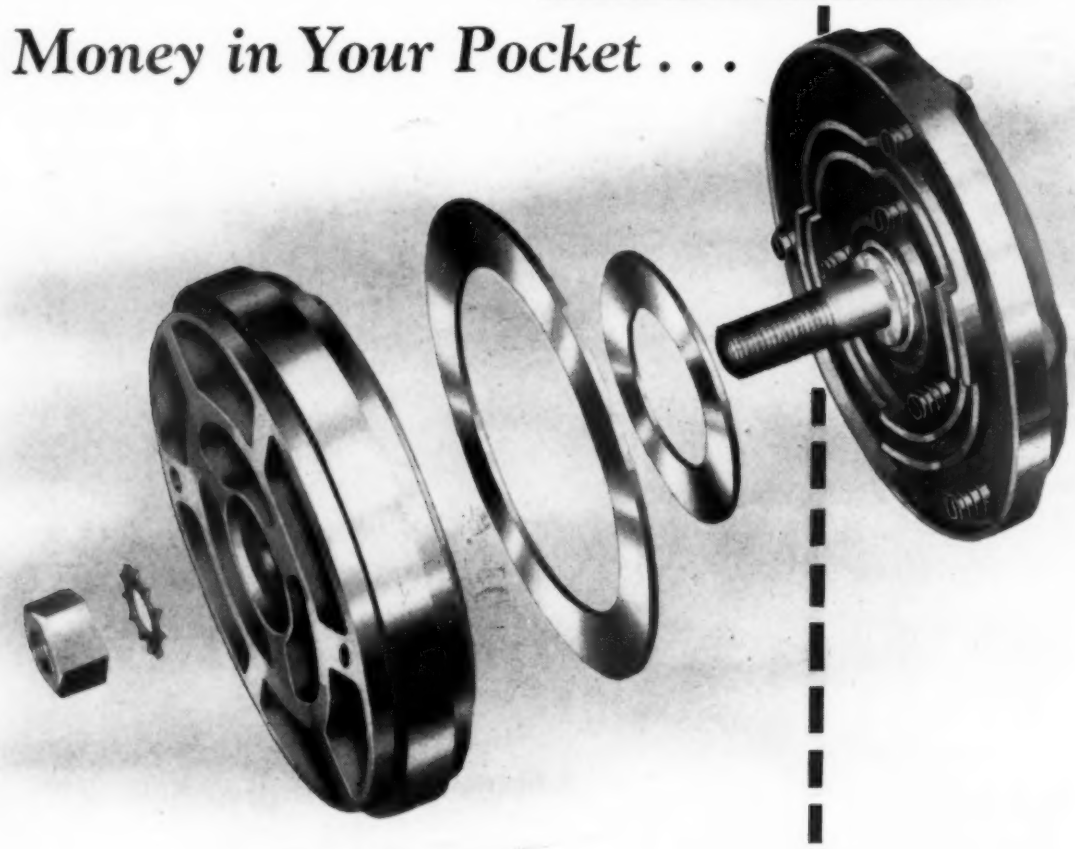
ALLIS AC CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

EQUIPMENT FOR THE FOUNDRY INDUSTRY

Why Gardner-Denver CUSHIONED Valves

Put Money in Your Pocket . . .



This is a Gardner-Denver Duo-Plate Valve. Examine it carefully. It's one reason why Gardner-Denver Compressors have such high delivery capacities—with lowest power consumption per foot of air delivered.

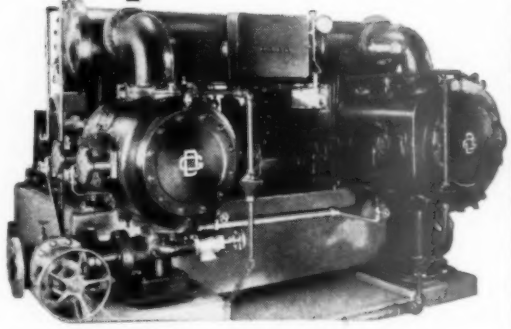
The discs of these Duo-Plate Valves trap air beneath them as they seat against the stop plate. This trapped air cushions impact—the greatest single cause of valve wear. Longer valve life with silent operation is assured.

The valve discs are free to *rotate* against the seat. Thus, because of "wearing in," the fit actually becomes better with use!

Gardner-Denver Duo-Plate Valves are double ported—have maximum area for a given diameter that means high sustained efficiency.

Experience in hundreds of installations shows that Gardner-Denver Duo-Plate Valves require a minimum of replacement—and keep their high efficiency.

Be sure *your* air compressor is equipped with Gardner-Denver Duo-Plate Valves. It will be—if it bears the famous G-D emblem!



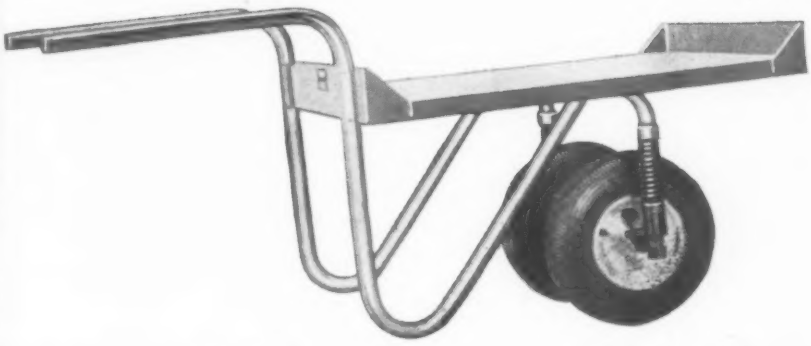
Gardner-Denver Class HA 2-Stage Horizontal Compressor. Available in capacities from 316 to 2012 cubic feet displacement per minute. Five-step capacity control and Gardner-Denver Cushioned Duo-Plate Valves, of course.

For full information, write Gardner-Denver Company, Quincy, Illinois

GARDNER-DENVER

Since 1859

SPEED UP HANDLING!



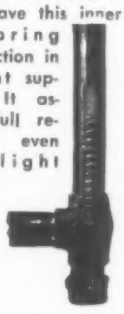
CMD PNEUMATIC CORE BARROW Model C-2

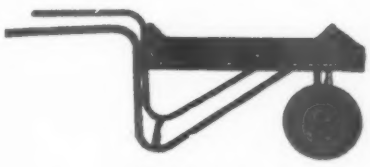
This sturdy two-wheeled core barrow with pneumatic tires and inner springs in the uprights over the wheels (an exclusive CMD feature) speeds up handling heavy loads in the foundry.

and Reduce CORE Breakage

with CMD PNEUMATIC CORE TRUCKS

Only CMD Pneumatic Core Trucks and Barrows have this inner coil spring construction in upright supports. It assures full resiliency even under light loads.



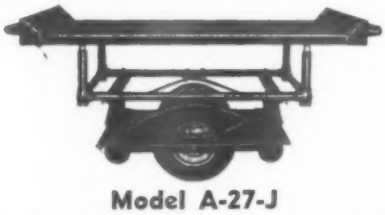


Model C-1

This light-weight easy-to-handle single-wheel pneumatic core barrow simplifies core handling in crowded places.

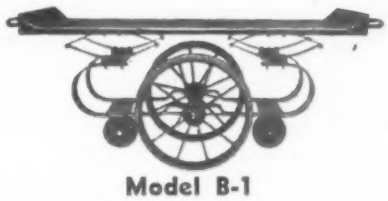
Model A-27

Big loads can be moved safely and quickly with this truck. Three sizes: 27" x 60"—800 lbs. capacity; 27" x 72"—1,000 lbs. capacity; 27" x 84"—1200 lbs. capacity.



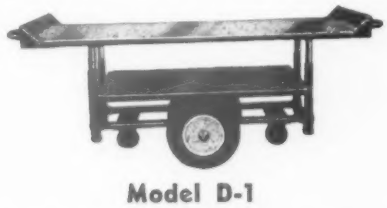
Model A-27-J

Light and heavy loads can be carried with complete safety by the sturdily built Model A-27-J Core Truck. Loading platform is 27" x 60" long. Loading capacity is 600 lbs. Elliptical springs and inner coil springs in the uprights assure correct resiliency.



Model B-1

The resilient chassis of this truck is made of spring steel properly heat-treated and includes intermediate elliptical springs for maximum cushioning protection. The solid rubber tired, steel-spoked wheels have Hyatt Roller Bearings. Load capacity, 700 lbs.



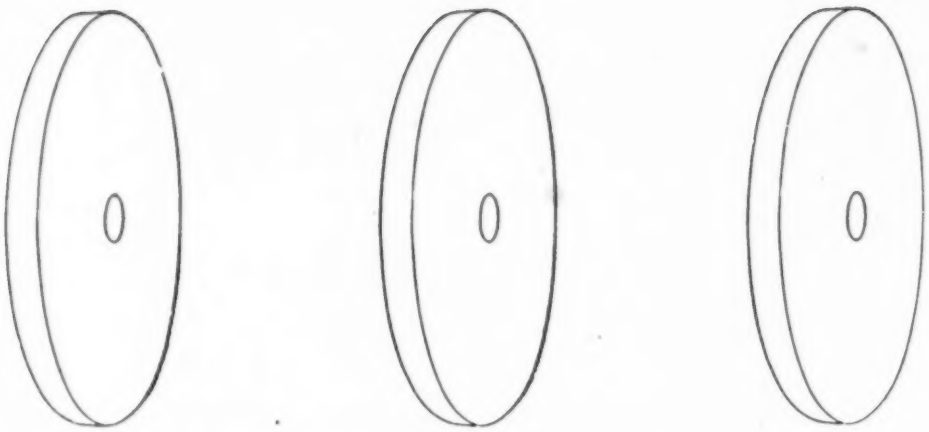
Model D-1

This truck has two loading trays and is sturdily built to give years of service of moderate cost. This truck has CMD inner coil springs in the uprights and has two Pneumatic-tire wheels. It is the outstanding value in moderately priced core trucks. Load capacity 600 lbs.

Write today for catalog on CMD Core Trucks, Core Barrows and other foundry specialties!

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 5F, 1928 West 46th St. · · Chicago 9, Illinois



C-GRADE H-GRADE R-GRADE

There's more to grinding grades than the A, B, C's

The A, B, C's which appear as identification on a grinding wheel help simplify proper grade selection. By clearly showing relative hardness, they make your choice quicker, easier...aid in assuring the right grade for the job. That's one reason wheels by CARBORUNDUM are plainly marked. But, there's more to it than the old chestnut, "the softer the metal, the harder the wheel." It's not that easy.

You realize, for instance, that wheel speed itself affects grinding action. The same grade reacts differently at various speeds. The condition of the machine and the amount of vibration can make a difference. Desired finish...required tolerance must be considered. Coolant conditions vary. The actual type of operation—snagging, surfacing, internal grinding or whatever it is—influences practical selection.

Yes—there are many important factors to check before you can be sure of the right grade designation for the job.

That's why we suggest consulting your CARBORUNDUM salesman or our distributor's representative. These men work throughout the year on a wide variety of grinding problems. They are familiar with grinding in production... in tool rooms...wherever it is used. They have practical knowledge and experience to help you pick exactly the wheel you need for the job.

Assisting these representatives in the field are our Abrasive Engineers. Specialized experts, they are equipped to analyze uncommon problems...recommend sound solutions. And, here in our modern laboratories are scientists and technicians who are working on the application of abrasive developments to changing grinding practices.

This *three way route* to better grinding is easy to use. No obligations are incurred. Merely talk "grinding" with a CARBORUNDUM representative. He'll be glad to assist you. The Carborundum Company, Niagara Falls, N. Y.

A good rule for good grinding . . . **CALL IN**

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TRADE | MARK

ABRASIVE WHEELS

Silicon Carbide
Aluminum Oxide
Diamond

COATED AND BONDED ABRASIVES

Paper and Cloth Combinations
Sheets, Rolls, Discs
Cylinder Hones
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ABRASIVE GRAINS AND COMPOUNDS

for:
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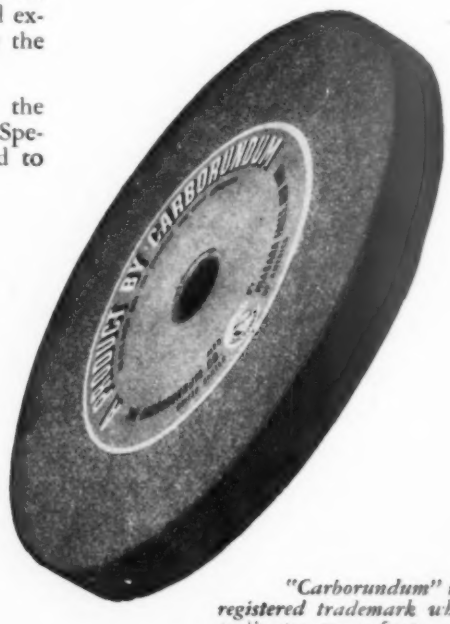


"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

THE SPOTLIGHT OF LEADERSHIP

WHITING

First

SINCE 1884

Whiting was first—more than 60 years ago—to make scientific melting available to all foundries by producing and distributing the Whiting Cupola. Through the years it has been a leader in bringing improved methods, practices, and equipment to the foundry industry.

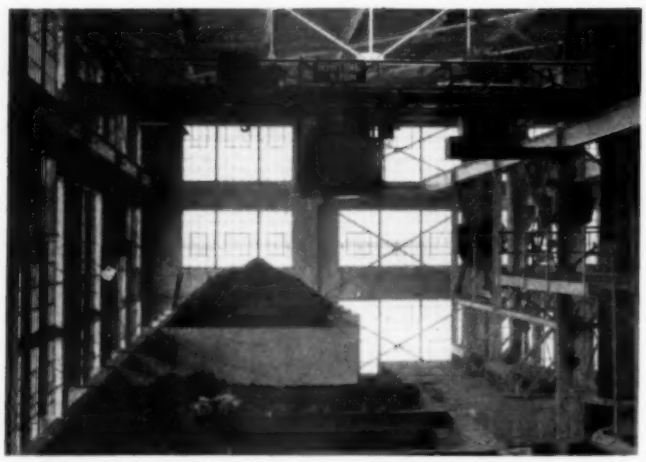
Many Whiting innovations have originated in the alertness and experience of our own foundrymen-engineers. Other ideas have come from foundrymen in the field who have found better ways to solve old problems.

Regardless of source, Whiting continuously seeks to bring these improved methods and devices to as many foundries as possible. Those who have watched the growth of the foundry industry in America will recognize the part Whiting has had in developing and introducing:

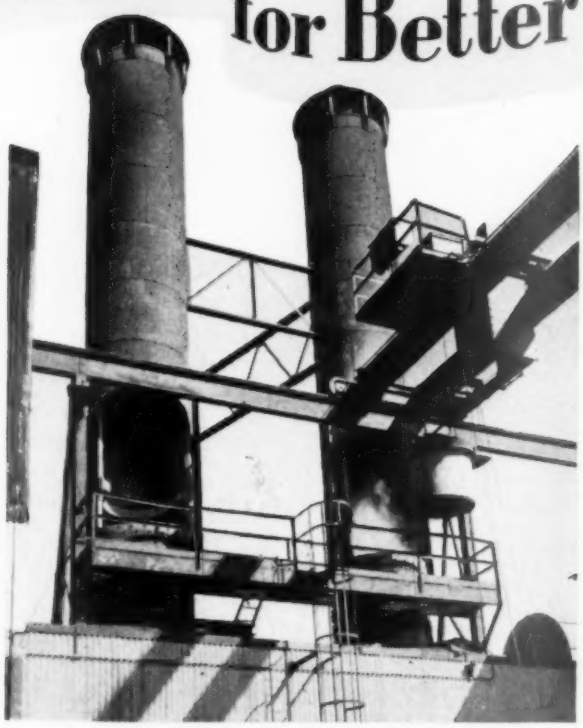
Cupolas
Hot Blast
Dry Blast
Balanced Blast
Mechanical Charging
Converters
Electric Furnaces
Rotary Furnaces
Cradle Furnaces
Duplexing and Triplexing
Improved Ladles
Coal Pulverizers and pulverized coal firing
Tumbling Mills and Hydro-Blast cleaning
Hydro-Clone wet dust suppression

For the latest advances in foundry practices and equipment there is one outstanding source—WHITING.

Look to WHITING *for Better*

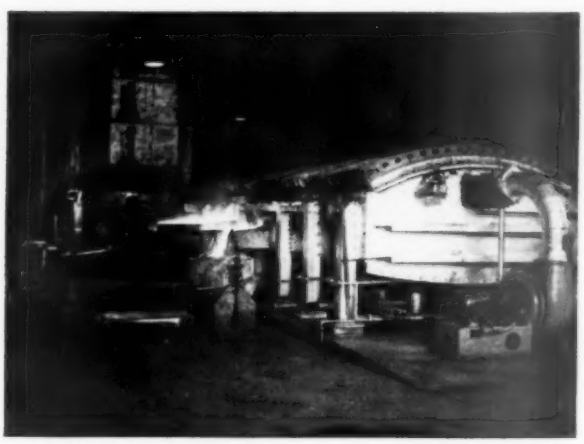


Whiting Charging Crane and cupolas in a large railroad foundry. Whiting can supply anything from a simple skip hoist to a completely mechanized handling and charging system.



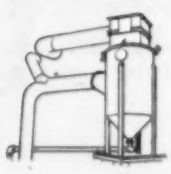
Close-up of two cupolas at the charging zone, showing service platform, safety cage ladder, wishbones, and underslung charging crane with funnel-top cone-bottom charging bucket.

Whiting 10-ton Cradle Furnace is tilted for pouring. Supplied from a rotary furnace, this equipment provides homogeneous hot metal for a continuous pouring system.

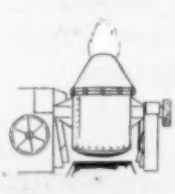


Malleable iron duplexing furnace, fired with pulverized coal. Whiting supplies all types of melting and holding furnaces, and also coal pulverizers and pulverized coal burners.

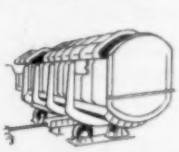
DUST SUPPRESSORS



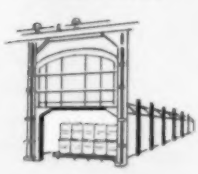
CONVERTERS



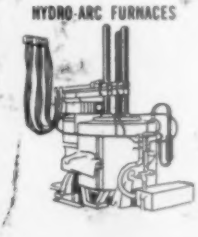
CRADLE FURNACES



ANNEALING OVENS

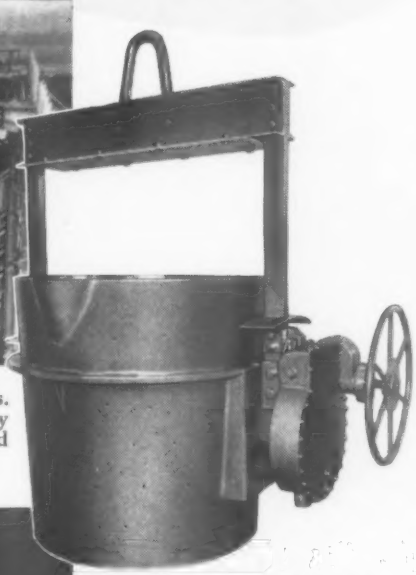


HYDRO-ARC FURNACES

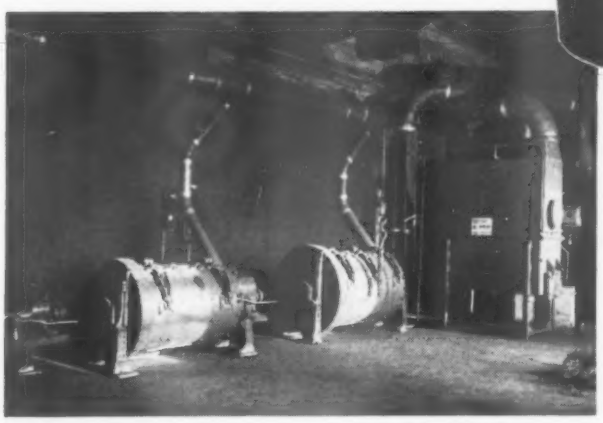


Foundry Equipment

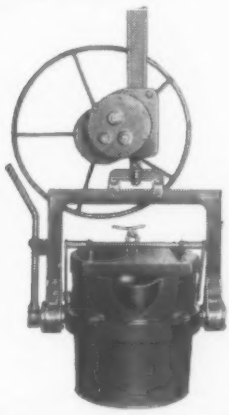
Make-up bay served by two Whiting Cranes. Coke and limestone are fed through gravity chute into charging buckets from hoppers, and iron charges are handled by magnet crane.



Whiting Pour-Rite all-welded crane ladle with air-cooled trunnions, improved gearing.

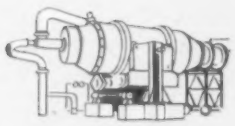


Whiting Hydro-Clone Dust Suppressor handles a line of tumblers and grinders in a cleaning room. This equipment uses wet suppression to reduce harmful dusts to harmless sludge. Water is recirculated.

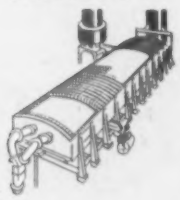


Pour-Rite Ladle Handler designed for pouring speed and accuracy.

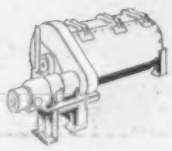
ROTARY FURNACES



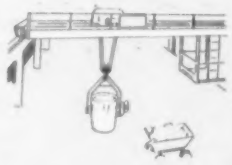
DUPLEXING SYSTEMS



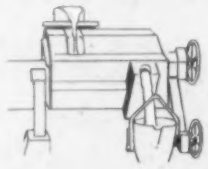
TUMBLERS



CRANES



MIXING LADLES



WHITING
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15607 Lathrop Avenue, Harvey, Illinois

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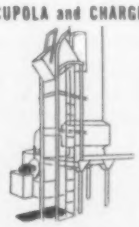
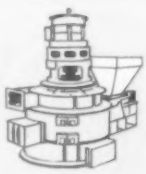
CUPOLA and CHARGER



PULVERIZERS



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☐ Duplexing	☐ Annealing Ovens	☐ Dust Suppressors

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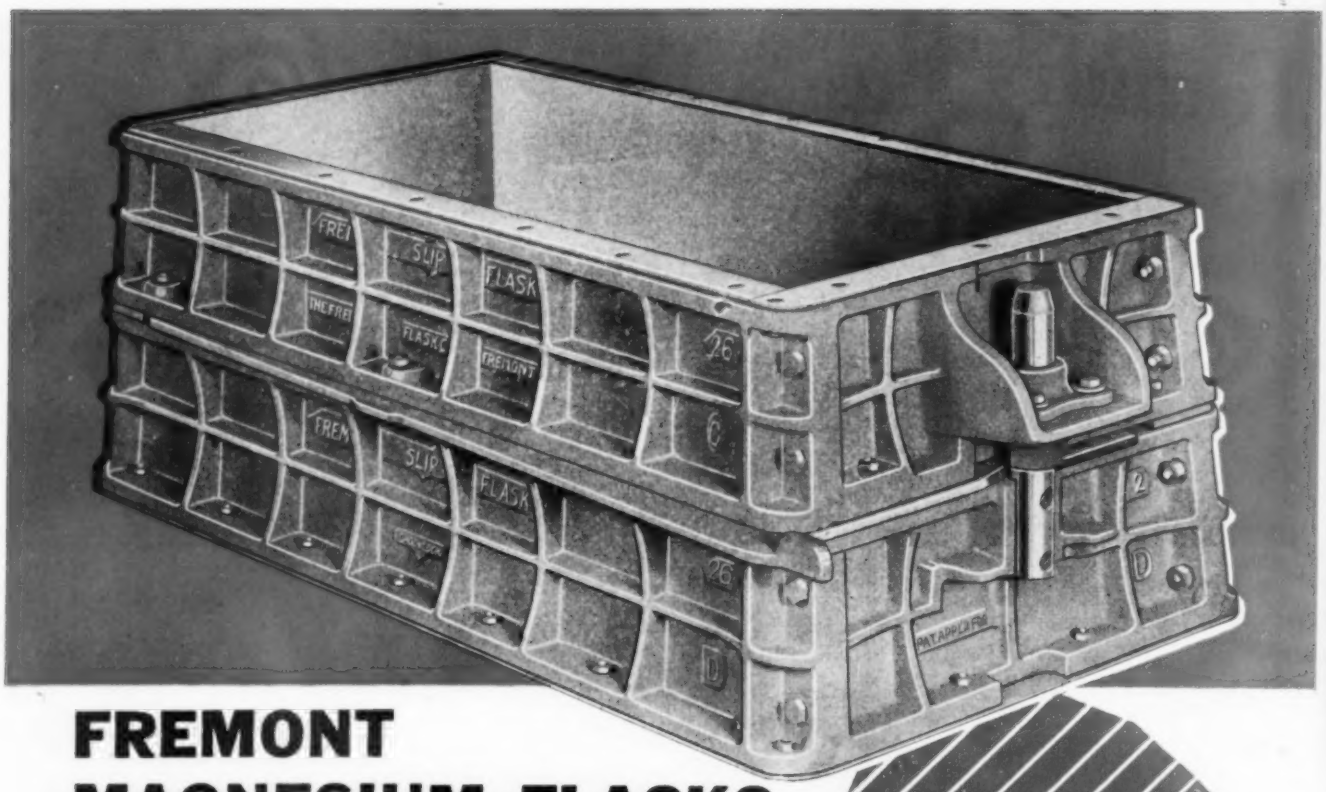

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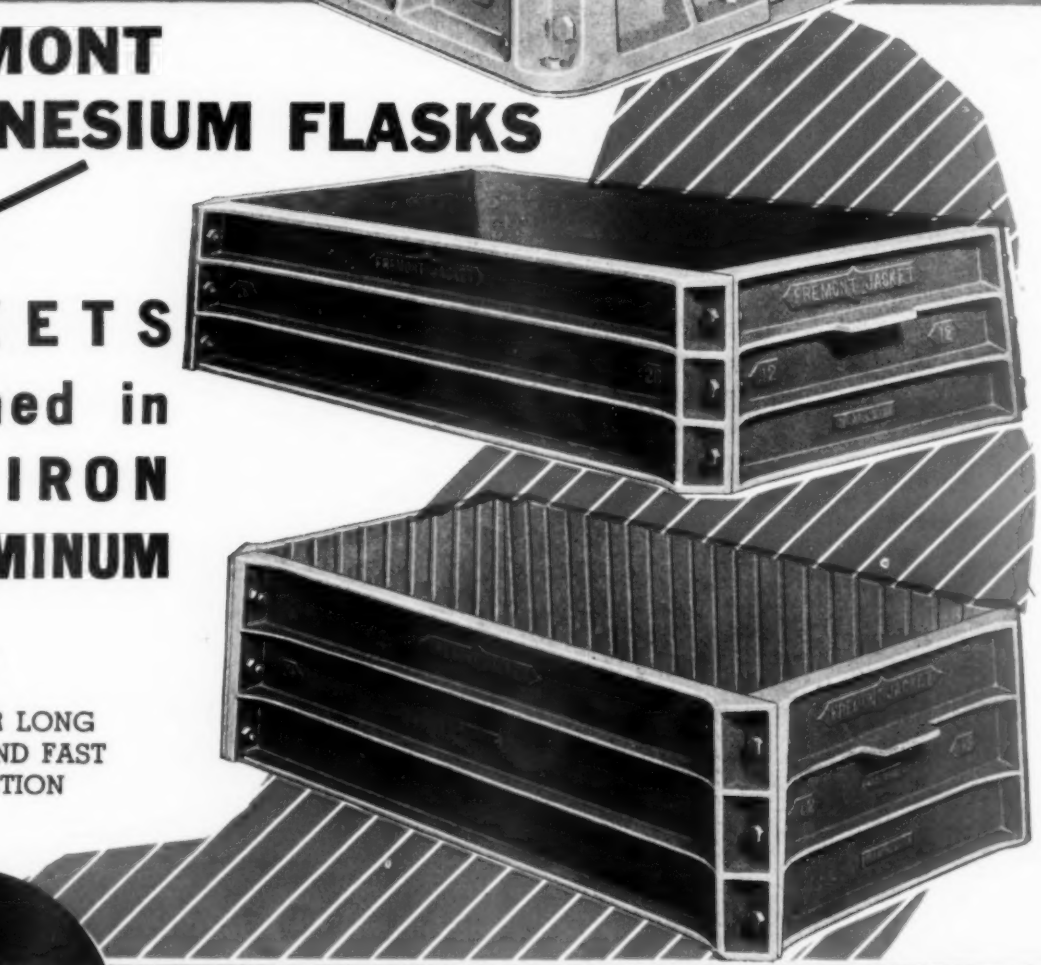

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THE FOOL-PROOF PIN

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FREMONT, OHIO

Speed + STAMINA = STROMAN FURNACE PERFORMANCE

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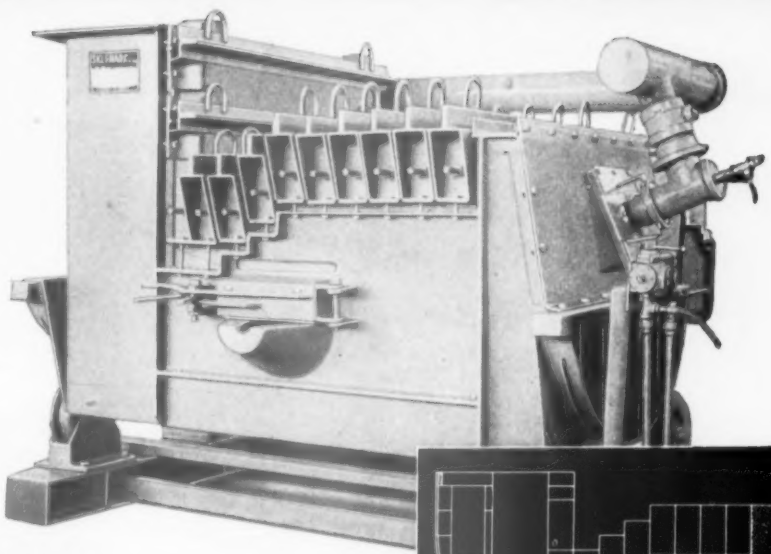
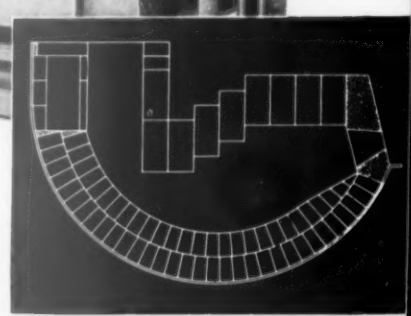
For Melting Brass, Bronze, Aluminum, Sklenar Non-Crucible, Direct Fired, Improved Reverberatory Melting Furnaces are the fastest melting furnaces built. Their design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will show fuel savings up to 40%; as the combustion chamber is heated by the same fuel used to melt metal in the throat of the hopper. They are also very successful in the making of Grey Iron Castings. The furnace Illustrated is the 1000 lb. size, and is oil fired. Gas fire is also available. Full information upon request.





STROMAN MANUAL TILT CRUCIBLE MELTING FURNACES

For Brass, Bronze, Aluminum

This illustrates a gas fired unit with two gas burners. Accessories for the mixing of gas and air in correct proportions are also shown and are furnished with the unit. This is the most modern and efficient means of burning gas that is known today. Furnaces up to and including No. 100 crucible are equipped with one gas burner. Larger sizes are furnished with two burners.

STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals

Sturdy, efficient and featuring the Stroman Push-Back Cover, these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 Crucible.

Write immediately for full information TO NEW ADDRESS

STROMAN STATIONARY CRUCIBLE MELTING FURNACES

For Aluminum and other White Metal Alloys

These furnaces are designed primarily for use in permanent mold and die casting plants. They are equipped with a special shield to protect operators against excessive heat . . . are most efficient in operation . . . and handle capacities from 200 to 820 pounds of Aluminum. They may also be used as holding or breakdown furnaces. Oil or Gas fired.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

VOLCLAY BENTONITE

NEWS LETTER No. 16

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

STEEL

Southern Bentonite in Steel Sands

Recently there has been a trend to add Panther Creek (Southern) Bentonite to steel foundry sands. The reason for the addition was to obtain better collapsibility, less cleaning and shakeout expense. Panther Creek has low dry and hot compression strengths.

One steel plant rebonds all their backing sand with Panther Creek to avoid lumpy sand conditions after the heat has penetrated the mold.

Another adds Southern Bentonite to dry sand work to prevent cracked castings and to eliminate sand baking in pockets and recesses.

On small steel castings, as much as 75% Panther Creek may be used to give better green flowability to the sand, which means better and more even ramming.

Cereal may be decreased, or entirely eliminated, by using Southern Bentonite as many like properties are developed. However, mold skin hardness is decreased when Panther Creek is substituted for cereal binders.

AMERICAN COLLOID COMPANY

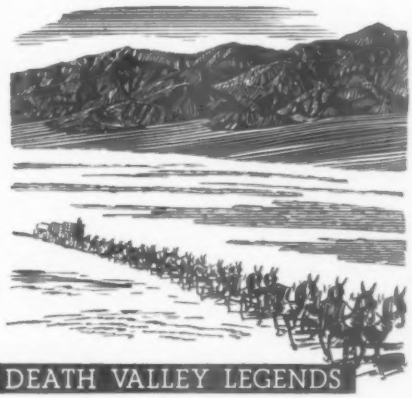
363 WEST SUPERIOR STREET • CHICAGO 10, ILLINOIS

Producers of Volclay and Panther Creek Bentonite

THE STORY OF BORON

CENTURIES OLD

1 As long ago as the sixteenth century, records show that borax, a source of boron, was exported to Europe from Central Asia through Constantinople and Venice. The Persians called it "burah" from which we took our word "borax." Boron was isolated in 1808 by both Davy and Gay Lussac.



DEATH VALLEY LEGENDS

2 Formerly mined in Death Valley, borax was hauled great distances by the legendary twenty-mule teams under adverse conditions of rugged topography and intense heat. Known to the housewife as a cleansing agent, borax is also used industrially in soldering, welding, and the making of enamels.

ACTIVE WHEN HOT

3 Unaffected by air at ordinary temperatures, boron is nevertheless extremely reactive at high temperatures, particularly with the elements oxygen and nitrogen. That's why it is used as a deoxidizer and degasifier by the metal industry. It is also used to refine the grain of aluminum alloys.

MUCH FROM LITTLE

4 Boron improves the hardenability of steels; only a minute amount of boron is necessary to give the desired results. To avoid complete oxidation of this small quantity, the boron must be protected by other strong deoxidizers, or it must be added to a completely deoxidized bath.

HEAVY DUTY AGENT

5 Electromet produces "Silcaz" and "Silvaz" alloys, containing other strong deoxidizers that will protect the boron when added to the molten steel. Boron-treated steels are used for heavy machine parts such as gears and shafts. The presence of boron improves the quality of certain high-speed tool steels.

For Alloy Users...

Electromet supplies ferroboron, manganese-boron, nickel-boron, and the special boron-containing alloys, "Silcaz" and "Silvaz." Constant research by Electromet has continually developed newer and better alloys. An explanation of Electromet's service to users of ferro-alloys, and descriptions of Electromet's products are included in the booklet, "Electromet Ferro-Alloys and Metals." Write to our Technical Service Department today for a copy.

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"Silcaz" and "Silvaz" are trade-marks of Electro Metallurgical Company.

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The 12"-38" Adams Jolt Squeezer, Portable Type

Produce Efficiently...Use A

EFFICIENT DESIGN— Simplicity in design has been a characteristic of Adams Molding Machines for the past fifty years. The importance of this factor is expressed in the efficient performance of our current line.

PRECISION MANUFACTURE—The most modern equipment is used in the manufacture of these machines, and unusually close tolerances have been established. All parts are interchangeable.

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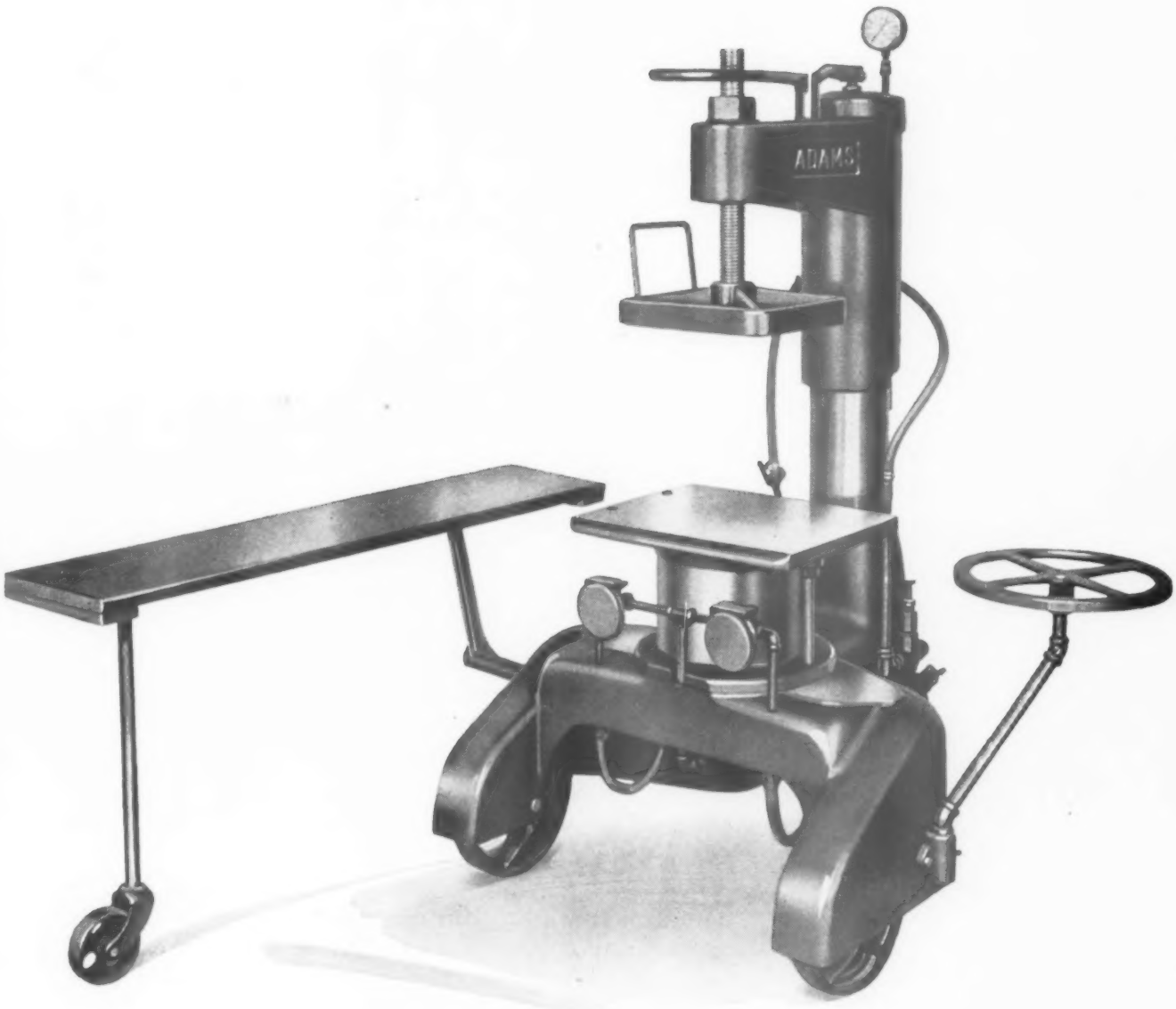
MOLDING MACHINES · FLASK E



The 10" Post Type Jolt Squeezer, Portable Type

Adams Molding Machines

LESS MAINTENANCE—Careful selection of materials and reduction of moving parts to a minimum makes upkeep negligible. Centralized automatic lubrication and protection against sand and dust assist in reducing wear.

EASY OPERATION—Everything possible has been done to provide convenience for the operator, and this is reflected in increased output. Operating controls are properly located to reduce lost motion.

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K EQUIPMENT Established 1883

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of many foundries for cutting down costs!

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2. *Obtain the most efficient fire, fuel economy and subsequent long life of equipment. Correct combustion can double the life of crucible pots.*

With this data the Cities Service engineer can show at once how to save on fuel costs, and what the saving will mean in dollars and cents.

The Cities Service Industrial Heat Prover has been used successfully with every kind of fuel and with every type of combustion equipment.

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It does take a bit of believing, no doubt about it, to think that "grinding" wheels can be made to cut with knife-like speed. But, in "Electro" HIGH SPEED CUT-OFF WHEELS, we achieved amazing strength in wafer thinness. We perfected a cutting *edge*. We reduced cutting-off time from minutes to seconds. Tell us that we may and we'll show you *on your jobs*, on anything from tool-bit stock to ceramic materials, how Electro high speed cutting-off surpasses all other methods for speed, precision and safety.

In advance of this demonstration, we invite you to send for our new Grinding Wheel Manual, illustrated in full color and technically informative as to components, structure, selection, and operation. No wonder it is the most talked-of catalog in industry! Write for your copy. We'll send it free and post-paid.

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THE WORLD . . . BEST WISHES
FOR A PROSPEROUS NEW YEAR!
DAVENPORT MACHINE AND FOUNDRY CO.
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"I amazed our board when I showed them a 55% savings in material handling"
TURNS OVERHEAD INTO PROFITS
WE WANT LABOR TO SHARE THE BENEFITS

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No material or product is too cumbersome to lift, move or stack. You can store your products ceiling high. One man does it, where three or four men hand stack only half as high. You add storage space, release labor for more productive, pleasant work. Product damage is cut down, accidents lessened.

Give your business this chance to turn a fixed overhead into a fixed profit, while you lighten labor's load. Let an A.T.C. Material Handling Specialist survey your material handling. Mail the coupon.

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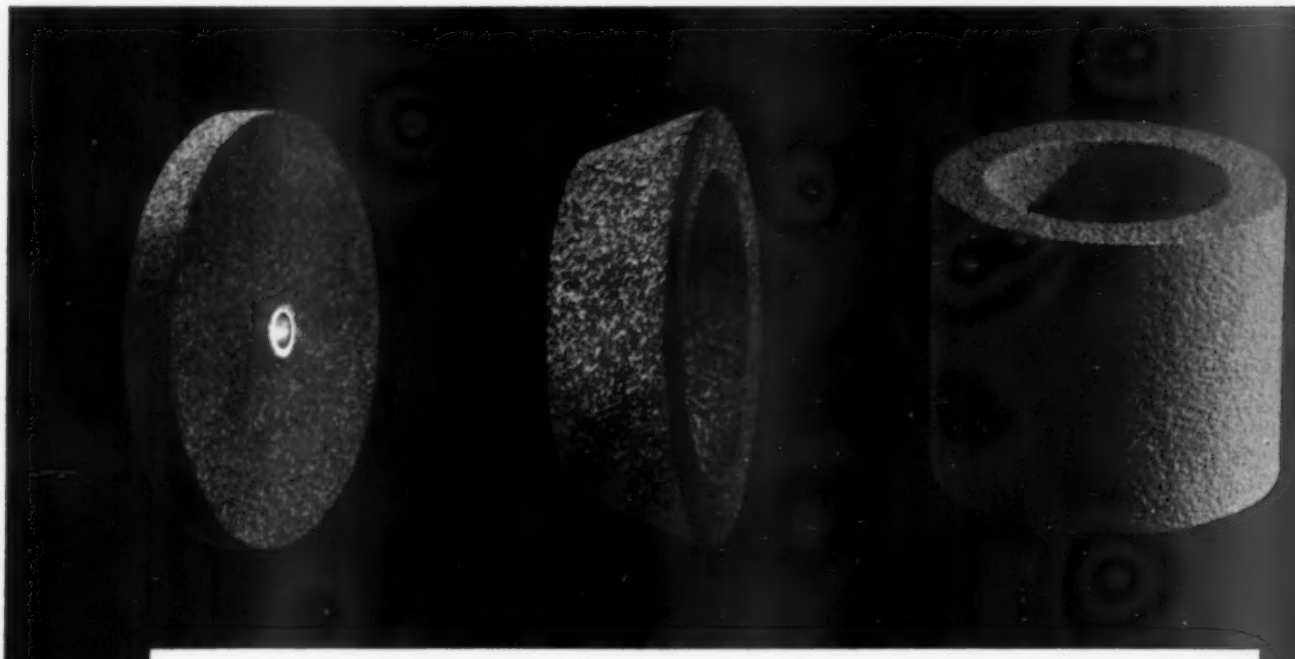
Street Address.....
City.....*State*.....



Christmas present for your cost department

Would you like to give your cost department a Christmas present of reduced production expenses?

Such reduction might be possible in your grinding operations. Since 1889, men in your industry have often been amazed by cost savings accomplished after shifting to specially built Peninsular grinding wheels.

Similar savings in your plant are probably possible. The best way to find out is to call in Peninsular engineers. They will study your machines, your grinding methods, and the metals you grind. They will then develop the correct grinding wheels for your particular work.

Every Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS

This Christmas tree is really Peninsular tapered cup wheels with a straight wheel top and—for a base, a surface grinding wheel.

SPACE SAVER

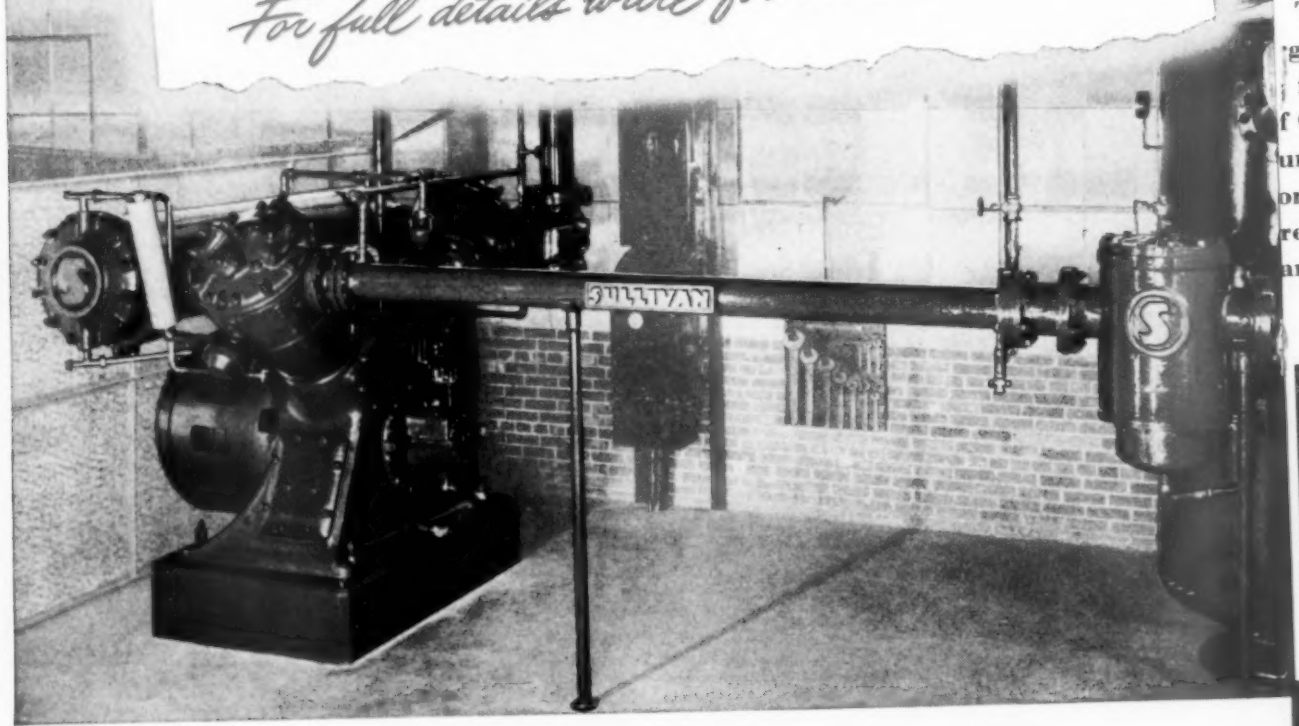
THAT PROVIDES LOW-COST COMPRESSED AIR

SERIES WN-112

for capacities of 378 to 1828 cfm, pressures up to 125 psi

If space is precious in your plant, that's one more reason why you'll want to specify the Sullivan WN-112 Compressor. It's more compact than other compressors of equivalent capacity because of its advanced design and use of alloy metals—and it operates more economically . . . gives longer heavy duty service. Installation is simple, and maintenance low.

For full details write for bulletin A-52



Sullivan Air Compressors

PORTABLE AND STATIONARY — ¼ HP TO 600 HP

ALWAYS DEPENDABLE!

W&D 1512

Consult a Joy Engineer

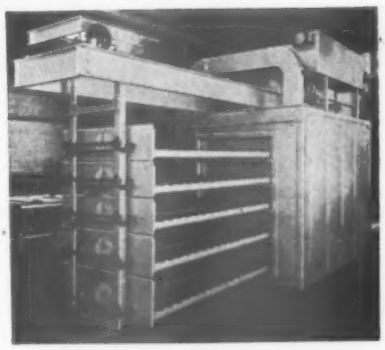
SULLIVAN DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

FROM CORES TO FINISHED CASTINGS

YOU INSURE QUALITY of HEAT TREATMENT with GEHNRICH OVENS and ROCKWELL FURNACES



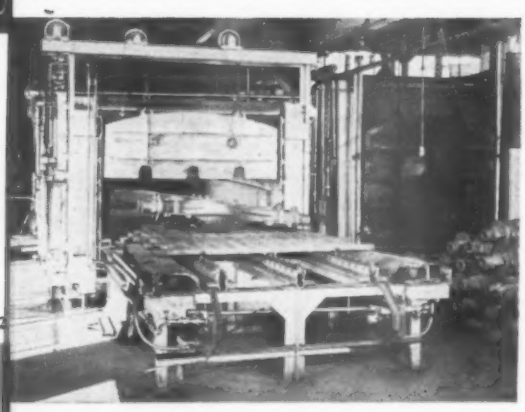
Gehnrich Pull-drawer Oven for core baking or heat treating; heated by gas or oil heater-air recirculation system.

The extensive experience of the Gehnrich-Rockwell organization is your assurance of getting the right oven or furnace for your heating job. Hundreds of installations of Gehnrich Ovens for core and mold drying, low temperature heating or metal finishing, and of Rockwell Furnaces for non-ferrous metal melting or for annealing and heat treating of castings, are doing excellent work in foundries, large and small.

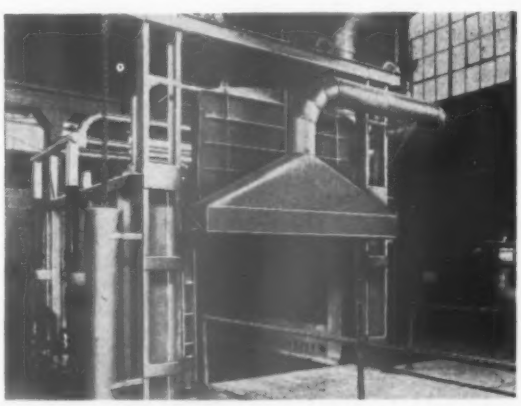
Let us send you our folder of bulletins.

Gehnrich Car Type Mold Oven—single or multiple compartment—assures drying uniformity through internal recirculation heating.

Gehnrich Monorail Conveyor Oven with preheating and baking zones, heated by external gas-fired air heater - recirculation system, for core baking.



Rockwell Pusher-Tray Furnace, gas-fired, for annealing large castings; handling system and heat control entirely automatic, saving labor and improving metal uniformity.



Rockwell Car-Bottom Furnace with oil-fired, bridge-wall heating system for uniform annealing of castings.

GEHNRICH OVENS • ROCKWELL FURNACES

W. S. ROCKWELL COMPANY • 210 ELIOT STREET • FAIRFIELD, CONN.

HOW TO GET ARC WELDERS IN A HURRY!

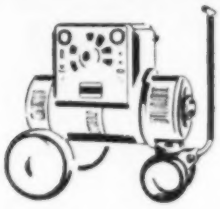
IT'S EASY FOR THE SMALL BUSINESSMAN TO GET THEM AT A SAVING.

Hundreds of arc welders are available to small businesses for immediate delivery. Some are unused. Some are used. All were made by well known manufacturers.

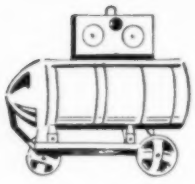
Now they are offered for sale at real bargain prices.

These are the type welders needed by garages, repair shops and maintenance shops. The large inventory includes welders of 200, 300 and 400 Ampere Rating, either DC or AC. They are located at various points throughout the country and may be inspected before purchase.

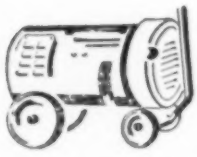
To obtain complete information on availability, location and condition of the equipment you want, fill out the coupon and send it to your nearest War Assets Administration Regional Office.



Hobart—Standard models of this make available in large quantities and most ratings.



Lincoln—In all models and most ratings. Many in the popular 300—400 Ampere size.



Westinghouse—Portable models available in limited quantities.

Electrodes and Welding Rods—Millions of pounds available in all types and sizes.

For full information clip and mail this coupon to:

War Assets Administration:
Please send me complete information on the availability, condition and location of the following types of equipment.

....Hobart Arc Welders ....Westinghouse Arc Welders
....Lincoln Arc Welders ....Electrodes and Welding Rods
Arc Welding Equipment AC....DC....
Electric Motor Driven: Volts....Phase....Cycles....
Transformer Type: Volts....Phase....Cycles....

Name.....
Firm.....
Address.....State.....
City.....

All Arc Welders are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein:

EXPORTERS

The War Assets Administration solicits your inquiries. Communicate with your foreign clients promptly.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

649-3

(Photo Courtesy of Milwaukee Flush Valve Company)

FISHER FURNACES are *First in the Foundry!*

YOU CAN COUNT ON "FISHERS" FOR BETTER FOUNDRY OPERATION.... *Because:*

1. Charging height of furnace is lower.
2. Proper melting rate assures production of better metal.
3. Pouring is under positive "finger-tip" control.
4. Maintenance is lower — parts are readily available.
5. "Fishers" are your best bet for *longer* crucible and lining *life*.

Fisher crucible, iron pot, steel pot, and open flame furnaces.

Fisher centrifugal blowers, burners, and linings.

For Melting All Non-Ferrous Metals. Write for literature — today!

Remember, if it's Monarch Equipment (or parts)— it's now made by Fisher, since our purchase of the furnace business of Monarch Engineering & Mfg. Co.

5519 N. WOLCOTT AVENUE, CHICAGO 40, ILL.

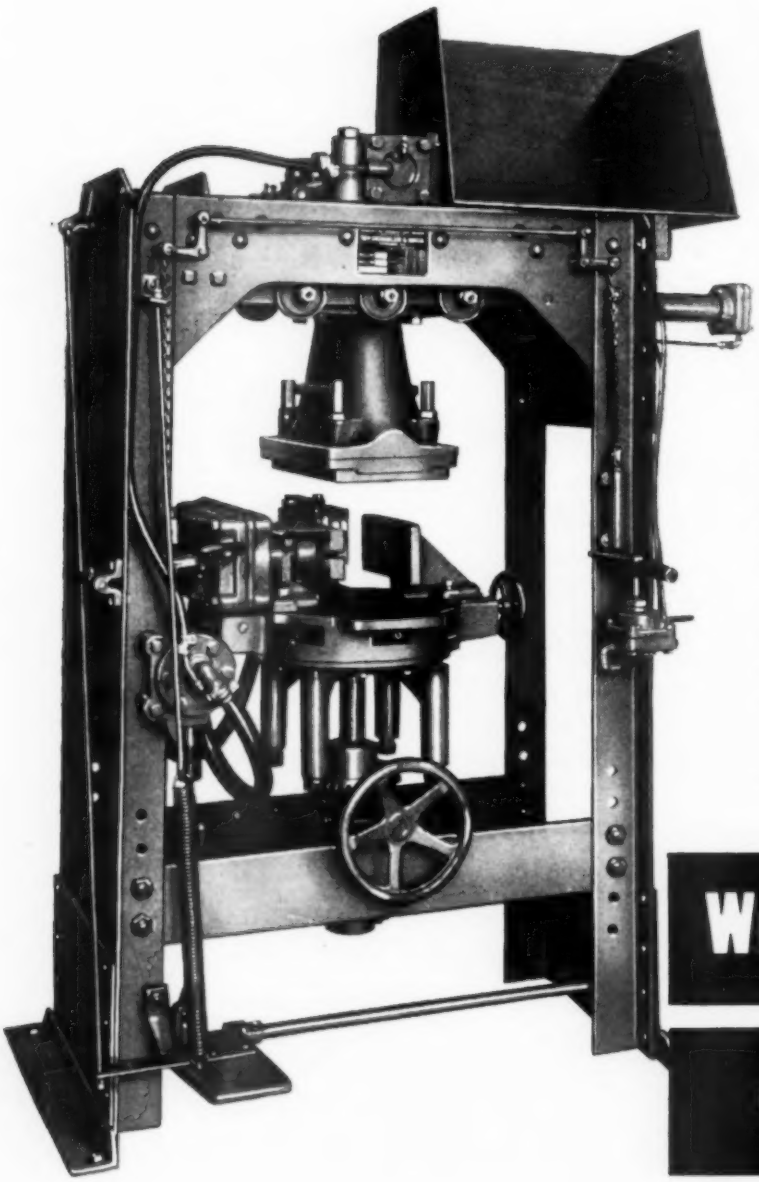
Fisher FURNACE COMPANY

Engineers and Manufacturers

VERSATILE!

The No. 1 Demmler

General Purpose Core Blowing Machine



The DEMMLER No. 1 general purpose Core Blower is a popular machine because it is a profitable machine to own.

Its versatility in blowing both small and medium size quality cores at a high rate of speed with maximum economy, coupled with its modest price and rugged dependability, has made it the leader in its field.

The machine is built on a rugged structural steel frame, has a productive capacity of about 200 core boxes per hour and is available with several different sizes of sand magazines. Job changes in from five to ten minutes are easy because hand wheels quickly raise and lower the chuck table and make the proper chuck jaw adjustments. The clamping, blowing and releasing operations are performed in less than four seconds.

For general-purpose small and medium core blowing work, choose the DEMMLER No. 1—the core blower with an unchallenged reputation for dependable, profitable performance.

WRITE FOR ILLUSTRATED FOLDER TODAY!

Wm. Demmler & Bros.

KEWANEE, ILLINOIS

Now . . . B-7 Resinoid Bond!

Another New Norton Development for the Foundry

THE same advantages of a fast cutting action plus long life which have made Norton B-5 Resinoid Wheels so outstandingly popular in the soft grades are now made available in the hard grades by the new B-7 resinoid bond. A stronger and more heat-resistant bond, it is showing remarkable cost cutting ability on swing frames, floor stands and portable grinders.

Available with the Sensational New 32 ALUNDUM Abrasive

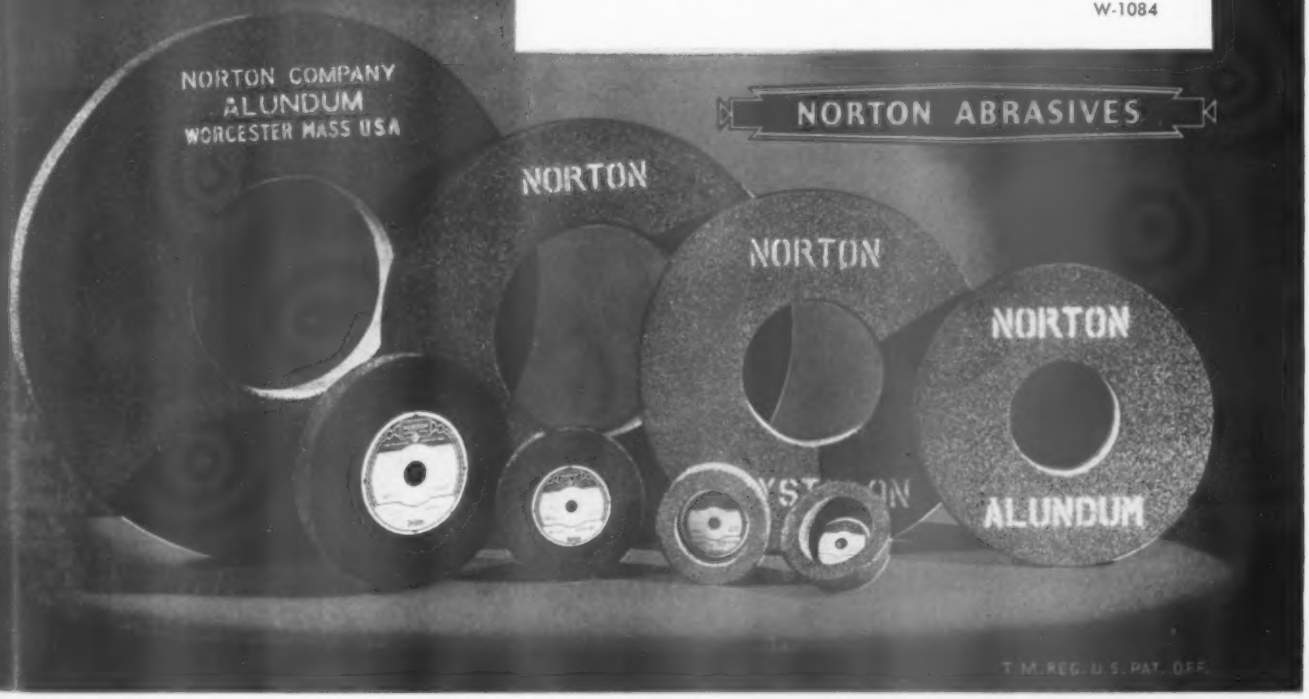
B-7 Resinoid Bond can be furnished with the fast cutting new 32 ALUNDUM abrasive as well as the other Norton abrasives — ALUNDUM, 57 ALUNDUM and CRYSTOLON.

It will definitely pay you to use either the Norton B-5 or B-7 Resinoid Bonds. Let a Norton abrasive engineer select the right one for each of your jobs.

NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

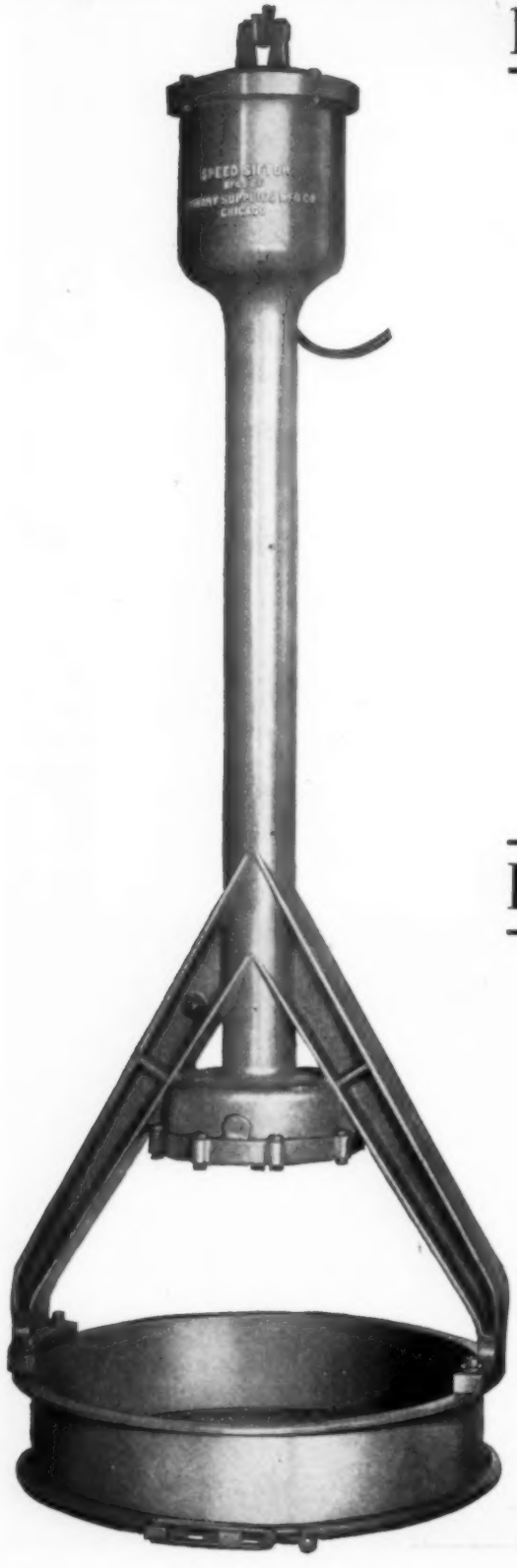
W-1084



Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

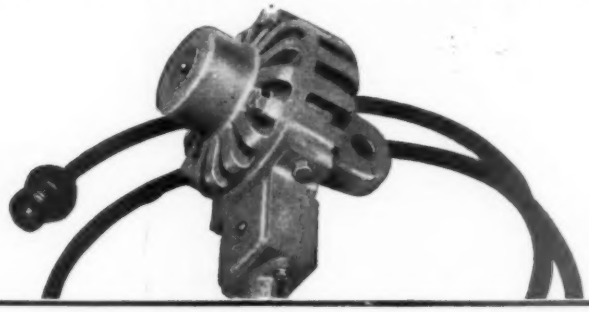
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$210.00 f. o. b. Chicago — complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase.

UNIVERSAL FREE-WHEELING model equipped with motor as above $195.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$12.00
No. 2—Medium match plate work	15.60
No. 5—Heavy match plate, tub and bench work	20.40
No. 9—Machine and heavier work	28.80

Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators: Single pole $3.60, Double pole $4.80.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street · **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

Products for the Iron and Steel Industries

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
ALSIFER	Aluminum .....20% Silicon .....40% Iron 40%	Used principally as a steel deoxidizer and for grain size control.
FERRO CHROMIUM High Carbon Grade	Chromium ....66-70% Carbon 4-6%	For wrought constructional steels and steel and iron castings.
Iron Foundry Grade	Chromium ....62-66% Carbon .....4-6% Silicon 6-9%	For alloyed cast irons. Readily soluble as a ladle addition at the lower temperatures of cast iron.
Low Carbon Grades	Chromium ....67-72% Carbon ..06%, .10%, .15%, .20%, .50%, 1.00% and 2.00% max.	For low carbon chromium steels, especially those with high chromium content, such as stainless and heat-resistant types.
FERRO SILICON 25-30% Grade	Silicon 25-30%	Deoxidizer for open hearth steels; also for high silicon, corrosion-resistant iron castings.
50% Grade	Silicon 47-52%	Used as a deoxidizer and for the addition of silicon to high silicon steels, for springs, electrical sheets, etc. Pulverized form used as ladle addition to cast irons for silicon content and graphitization control.
75% Grade	Silicon 74-79%	For high content silicon steels, such as spring steels, sheets and forgings of high magnetic qualities for electrical apparatus.
High Silicon Grades 80-85% 85-90% 90-95%	 Silicon .....80-84.9% Silicon .....85-89.9% Silicon 90-95%	 For high content silicon steels where small ladle additions are used for required silicon content. Also for manufacture of hydrogen by reaction with caustic soda and production of magnesium by the Pidgeon process.
FERRO TITANIUM High Carbon Grade	Titanium ....15-18% Carbon 6-8%	Final ladle addition to control "rimming" action and to clean effervescing steel. Final deoxidizer and scavenger for steel castings and fully killed ingot steels.
Medium Carbon Grade	Titanium ....17-21% Carbon 3-4.50%	Often preferred to the High Carbon Grade as a final ladle addition to very low carbon rimming or effervescing steels.
Low Carbon Grades 20-25% Ti Grade	Titanium ....20-25% Carbon ..max. 0.10% Silicon .....max. 4% Aluminum max. 3.50%	Carbide stabilizer in high chromium corrosion resistant steels of extremely low aluminum content. Deoxidizer for some casting and forging steels.
40% Ti Grade	Titanium ....38-43% Carbon ..max. 0.10% Silicon .....max. 4% Aluminum ..max. 8%	Carbide stabilizer in high chromium corrosion-resistant steels, where smaller ladle additions are desired and extremely low aluminum content is not essential.
VANADIUM METAL 90% Grade	Vanadium ....91.15% Aluminum ....3.87% Silicon .....0.50% Carbon 0.17%	For special iron-free (nonferrous) or low iron alloys or low impurity ferrous alloys.
95% Grade	Vanadium ....95.18% Aluminum ....2.00% Silicon .....0.27% Carbon 0.40%	Principally for research on the properties of pure alloys.

PRODUCT	TYPICAL COMPOSITION	APPLICATIONS
FERRO VANADIUM Grade "A" (Open Hearth)	Vanadium ....35-40% Silicon .....max. 12% Carbon ...max. 3.50%	For low percentage vanadium content of rolled, forged or cast constructional steels. Also used in vanadium cast irons.
Grade "B" (Crucible)	Vanadium ....35-45% Silicon ...max. 3.50% Carbon ...max. 0.50%	For tool steels and special steels containing high percentages of vanadium, in which required limits for carbon and silicon are narrow.
Grade "C" (Primos)	Vanadium ....35-45% Silicon ...max. 1.25% Carbon ...max. 0.20%	For tool steels and special steels requiring high percentages of vanadium and exceptionally low carbon and silicon content.
Special Grades	Vanadium ....50-55% 60-65% 70-80% Silicon .....Low Carbon .....Low	For special applications and uses requiring large vanadium additions.
VANADIUM PENTOXIDE Technical Grade Fused Form	V_2O_5 .....90%	A source of vanadium in basic electric furnace steels. A base for numerous chemical compounds.
Technical Grade Air Dried Form	V_2O_5 .....83-85%	A base for preparation of numerous chemical compounds, such as catalysts, etc.
GRAINAL ALLOYS Vanadium Grainal No. 1	Vanadium ....25.00% Aluminum ....10.00% Titanium .....15.00% Boron 0.20%	Practical and economical intensifiers for controlling and increasing the capacity of steels to harden, and for improving other important engineering and physical properties.
Vanadium Grainal No. 6	Vanadium ....13.00% Aluminum ....12.00% Titanium .....20.00% Boron 0.20%	See above.
Grainal No. 79	Aluminum ....13.00% Titanium .....20.00% Zirconium .....4.00% Manganese ....8.00% Boron .....0.50% Silicon 5.00%	See above.
GRAPHIDOX No. 4	Silicon .....42-46% Titanium .....9-11% Calcium 5-7%	New alloy for the graphitization of iron; ladle treatment insures iron with normal graphite, free from dendritic structure; reduces chill; efficient inoculant in the production of high strength irons.
V-FOUNDRY ALLOYS V-5 Grade	Chromium ....38-42% Silicon .....17-19% Manganese 8-11%	Used in cast irons as a ladle addition. Reduces chill, promotes uniformity of structure, increases strength and hardness.
V-7 Grade	Chromium ....28-32% Silicon .....15-21% Manganese ..14-16%	See above.
BRIQUETTES Ferro Chromium	Hexagonal in shape. Weigh approximately 3⅜ lb. and contain 2 lb. of chromium.	A practical and convenient form for adding ferro-alloys to the cupola.
Ferro Silicon	Two sizes available, both cylindrical in form, one containing 1 lb. of silicon; the other 2 lb. of silicon.	See above.

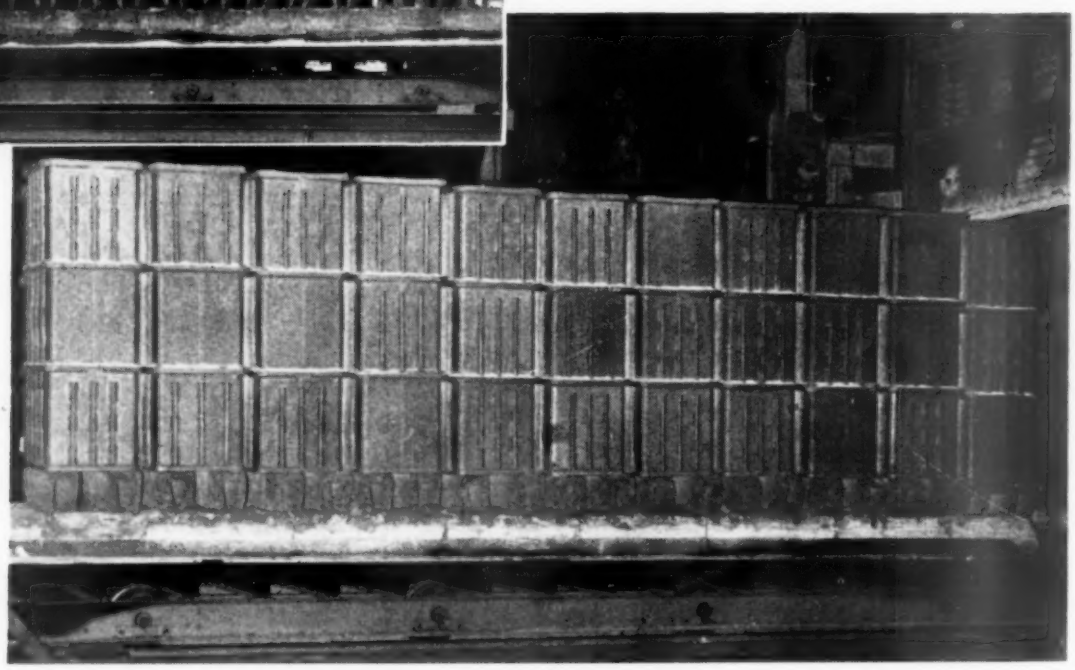
VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. · DETROIT · CHICAGO · CLEVELAND · PITTSBURGH

Make Those Furnaces Do More Annealing per Cubic Foot

By replacing your bulky cast iron annealing boxes with P. S. (for Pressed Steel) lightweight, space-saving, sheet alloy equipment, you can process more castings per heating cycle.

P. S. welded alloy sheet construction will produce boxes to your style and inside dimensions, but you can get more boxes on a car due to their thin gauge sheet walls.



P. S.
stands for
PRESSED
STEEL
COMPANY

P. S. Boxes Will Cut Costs 4 Ways

1. **Their light gauge walls will heat quickly and save fuel**
2. **Their 65% less weight facilitates quicker handling**
3. **They will last longer than cast iron boxes**
4. **They will increase production in your present furnaces**

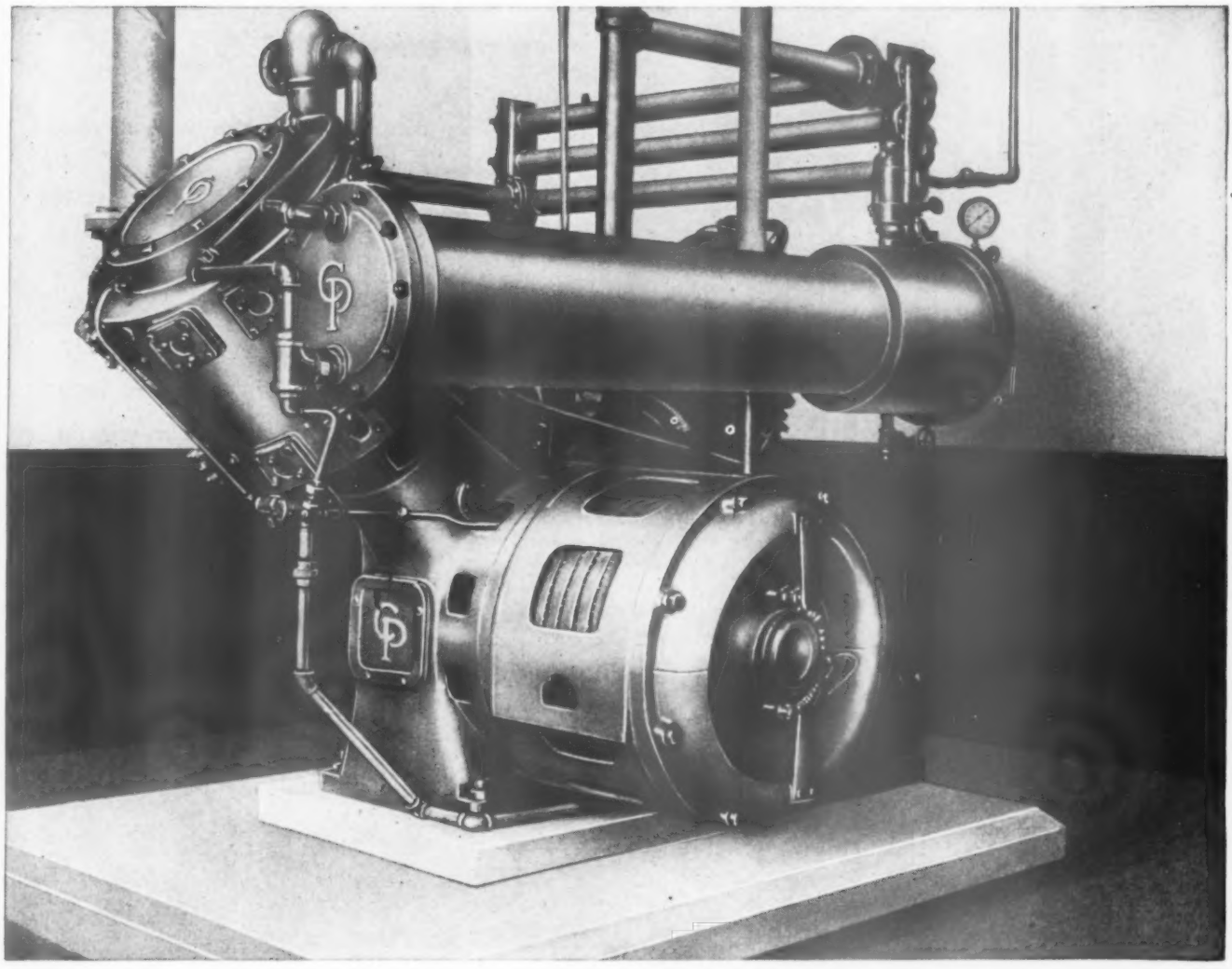
The above facts can be substantiated by case histories. Tell us the type and sizes of your furnaces and boxes and we will submit estimates without obligating you.

THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

BRANCH OFFICES: 312 Curtis Bldg., Detroit; 503 Nicholas Bldg., Toledo; 1915 Engineers Bldg., Chicago; 51 E. 42nd St., New York; 1005 Sterling Bldg., Houston, Texas; A & M Accessories Ltd., 19 Melinda St., Toronto, Canada; Broad St. Station Bldg., Philadelphia; 417 So. Hill St., Los Angeles.

PRESSED STEEL COMPANY PRODUCTS: Carburizing and Annealing Boxes, Thermocouple Protection Tubes, Seamless Steel Cylinder Caps, Seamless Steel Neck Rings, Welded Alloy Tubing for High Temperature and Corrosive Applications, Radient Tubes, Inner Covers and Base Sheaths for Steel Mills

WHERE *Compactness* COUNTS!



CP TYPE Y COMPRESSOR IS IDEAL

ALTHOUGH designed for restricted floor space, the CP Type Y Compressor provides high efficiency and low maintenance. Shipped complete as a "package", ready for external connections, it requires only a simple foundation and no special skill in aligning or installing.

Large area Simplate valves, multi-step capacity regulation, effective intercooling, precision bearings, and force-feed lubrication assure its exceptional performance. With built-in or direct-coupled motor, or with V-belt drive, available in capacities of 500 to 900 c.f.m., at 80 to 125 pounds pressure. Sizes for other pressures also furnished. Write for information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Quality...

THAT'S WHAT WE MAKE

A long time ago — when we started smelting — we had to make a decision. The question was . . . should we strive for volume production or a more limited quality production? Well, we made our decision . . . and have made quality alloys ever since. We've done very well, too, in building up our volume . . . and it is increasing every day.

Silverstein and Pinsof
INCORPORATED
1720 ELSTON AVENUE CHICAGO 22, ILLINOIS

BRASS • BRONZE • ALUMINUM • LEAD • TIN • SOLDER • TYPE METALS • BABBITT • ZINC BASE ALLOYS

THE HOUGH Payloader

ESSENTIAL IN EVERY FOUNDRY!

Now, with rising production costs—price regulation—increased labor difficulties—you need a Hough Payloader more than ever before. For the speedy little Payloader can help step in and break the production bottleneck of material handling. It eliminates slow costly wheelbarrow crews—speeds up handling of core and moulding sand—assures continuous production and maximum foundry efficiency. One foundry saved over 5000 manhours of labor in a four month period—plus greatly increased production and lower costs.

The Payloader is built small but powerful—operates in congested areas, in narrow aisles, inside of bins or railroad cars—one man operated, it loads, carries and dumps—can pull trailers or handle castings with special lift fork; can be used for snow removal and general plant maintenance the year 'round.

Check up now on the many advantages the Payloader provides. Over 100 Foundries are now using Payloaders.

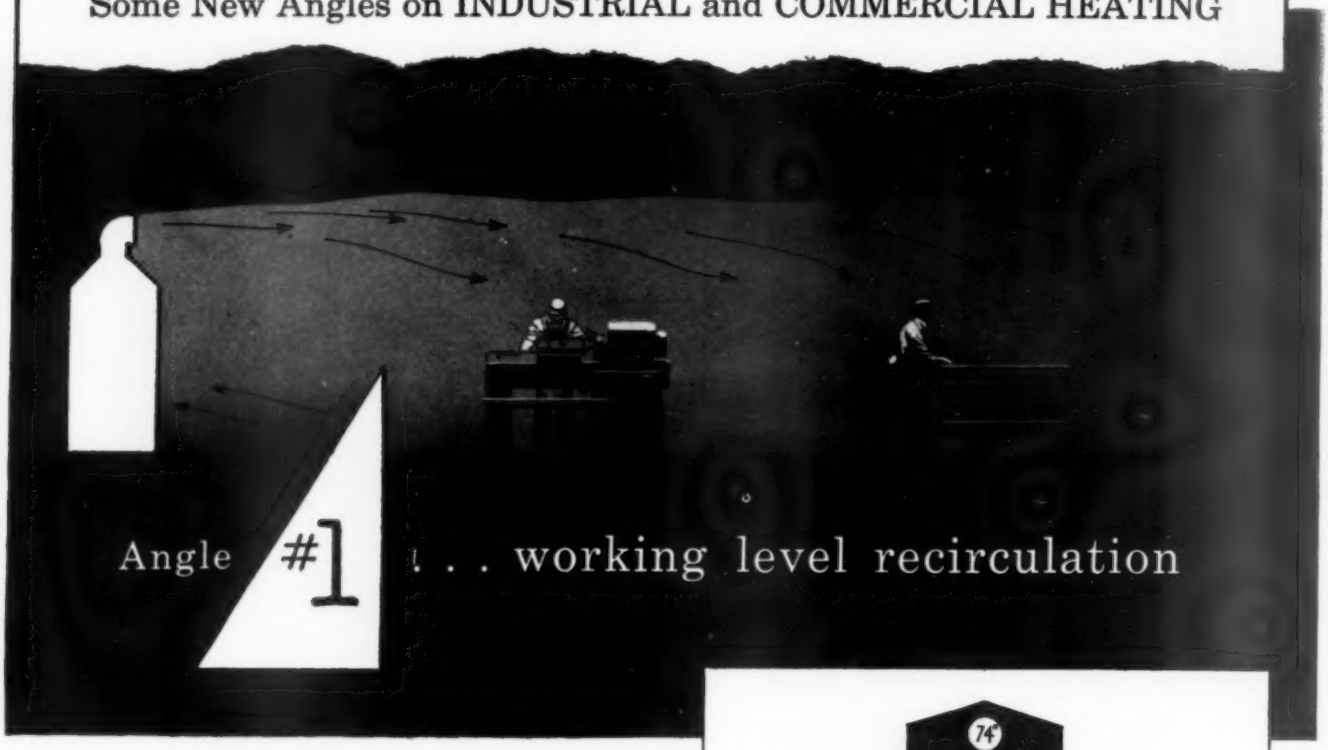
GET COMPLETE DETAILS

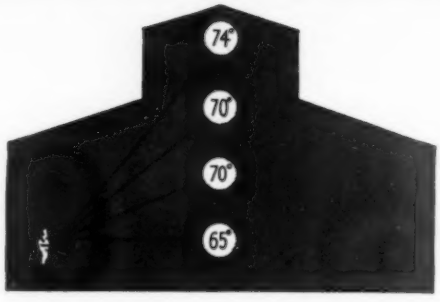
Send for this new catalog containing complete information, action pictures, mechanical details and specifications on the HA Payloader.

THE FRANK G. HOUGH CO.

MATERIAL HANDLING EQUIPMENT • LIBERTYVILLE, ILL.

Some New Angles on INDUSTRIAL and COMMERCIAL HEATING





Actual tests with balloon-suspended thermometers in a building with 200,000 square feet of roof showed temperature differential between roof and working area to be only 9 degrees with Dravo Heaters. This is a big fuel-saving advantage when compared with other methods in which roof area temperatures are often 35 degrees higher than those at the working level.

The Dravo Heater offers today's highest possible efficiency for open space heating. It recirculates warm air in the working level, thus minimizing the tendency of the heated air to rise and cause excessive heat losses through the roof. Under the Dravo method warm air is discharged above the heads of the workers and cool air is taken off the floor. This provides a thermostatically controlled comfort zone in the working level with no annoyance to workers.

In addition to saving fuel through low roof heat loss, the Dravo Heater is extremely economical in these respects . . . **Sustained efficiency of 80 to 85% by constantly getting more Btus from each gallon of oil or cubic foot of gas burned. — Lower initial cost compared with indirect heating systems. —Ease of installation . . . it is necessary only to provide power line, fuel line and stack. —No stand-by heat or specialized attendant is necessary. Heater operates only when thermostat dictates your requirements.**

Dravo Heaters are available in capacities ranging from 400,000 to 2,000,000 BTUs per hour output. The money-saving angles for Industrial and Commercial Heating with DRAVO COUNTERFLO DIRECT FIRED HEATERS are more fully described in Bulletin NI 516. Write Heating Section, DRAVO CORPORATION, 300 Penn Avenue, Pittsburgh 22, Pa.

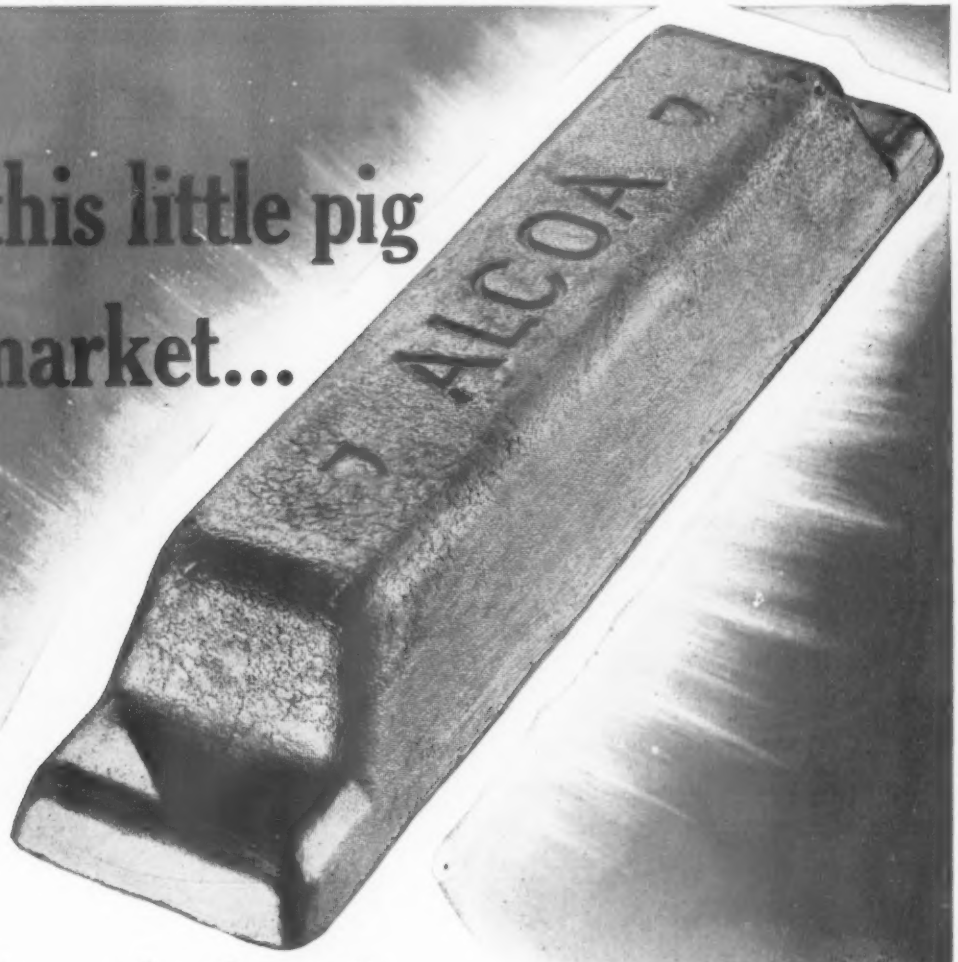
Dravo Counterflo Direct Fired Heaters are products of the Machinery Division.

DRAVO CORPORATION

PITTSBURGH • WILMINGTON • PHILADELPHIA • WASHINGTON

NEW YORK • CLEVELAND • DETROIT

When this little pig goes to market...

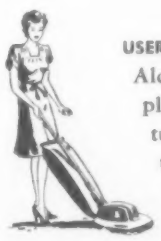


...look who's pleased

FOUNDRY MANAGERS like Alcoa Pig and Ingot, because they can depend on Alcoa analyses . . . know when making mixes that the next batch will behave like the previous one. A better aluminum to start with, their castings are better at final inspection.

FABRICATORS like it, because parts made of Alcoa Aluminum are consistently sound, uniform, and free from inclusions . . . the result of 58 years of working with aluminum. This permits free machining . . . less hard spots and dirt to dull machine tools. Men in the shop like to work with Alcoa Aluminum.

RETAILERS like products made of Alcoa Aluminum, because they have *sales appeal.* The public knows that an article made of Alcoa Aluminum is a good buy. Alcoa Aluminum is light, strong, durable . . . takes a fine finish. The customer is pleased—the retailer makes money.



USERS spark to merchandise made of Alcoa Aluminum. In household appliances, it lightens the load. In fixtures, it brightens the home. All of these things used in the home and in industry are better if they are made of Alcoa Aluminum Pig and Ingot.

Sales offices in 53 cities

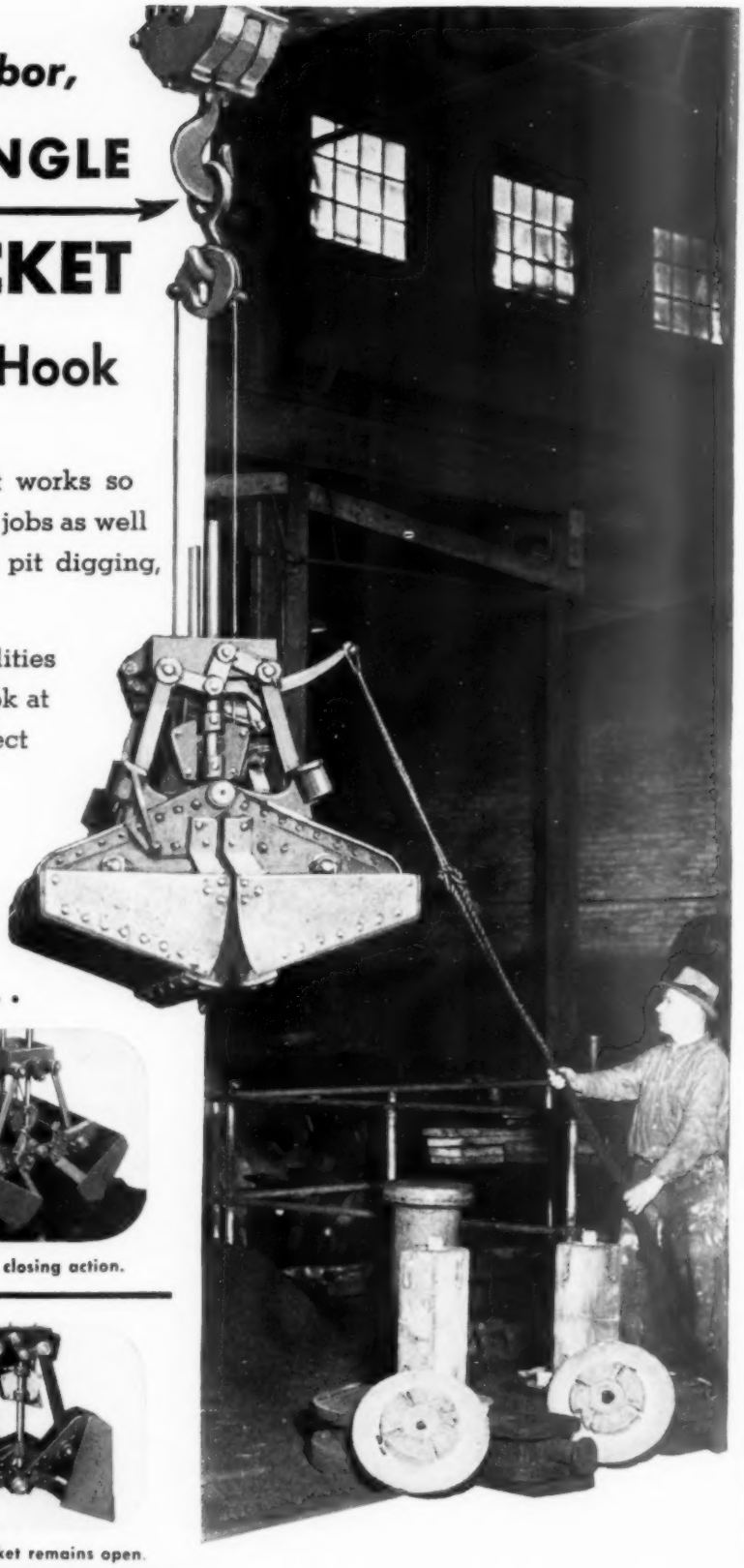
ALUMINUM COMPANY OF AMERICA, 1823 Gulf Bldg., Pittsburgh 19, Pa.

ALCOA FIRST IN ALUMINUM

IN EVERY COMMERCIAL FORM

Foundries Save Time, Labor, Money with P&H SINGLE LINE GRAB BUCKET

Hangs on Any Crane Hook

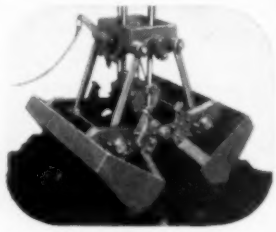


• The P & H Single Line Grab Bucket works so easily that your men can use it for small jobs as well as large, for floor cleaning, flask filling, pit digging, stock-piling, car unloading . . .

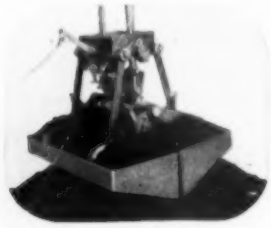
It never ties up overhead handling facilities because you can put it on or off crane hook at will. No special reeving is required. Perfect balance and simplified tripping insure accurate placement of materials. Built in five capacities, ½ to 2½ yards. Write for Bulletin C-27.

takes a full bite, picks up clean . . .

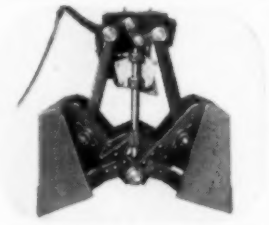
In position ready to dig.



Equalized closing action.



Bucket closes before it lifts.



Tripped, bucket remains open.

P&H

SINGLE LINE GRAB BUCKETS

4405 W. National Ave.
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

ELECTRIC CRANES • EXCAVATORS • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

Pioneered by North American

LUMINOUS OR LONG FLAMES
with either gas or oil are produced by the Series 113 Burners. They are desirable for vast coverage, for fewer burners and for uniformity of flame temperature.

SHORT FLAMES
are produced by the Series 221 Burners. These burners provide a highly stable and efficient fire, using either gas or oil. They are recommended wherever heating in a relatively small space is required.

WRITE FOR DESCRIPTIVE LITERATURE

DUAL-FUEL BURNING SYSTEMS FOR GAS AND OIL

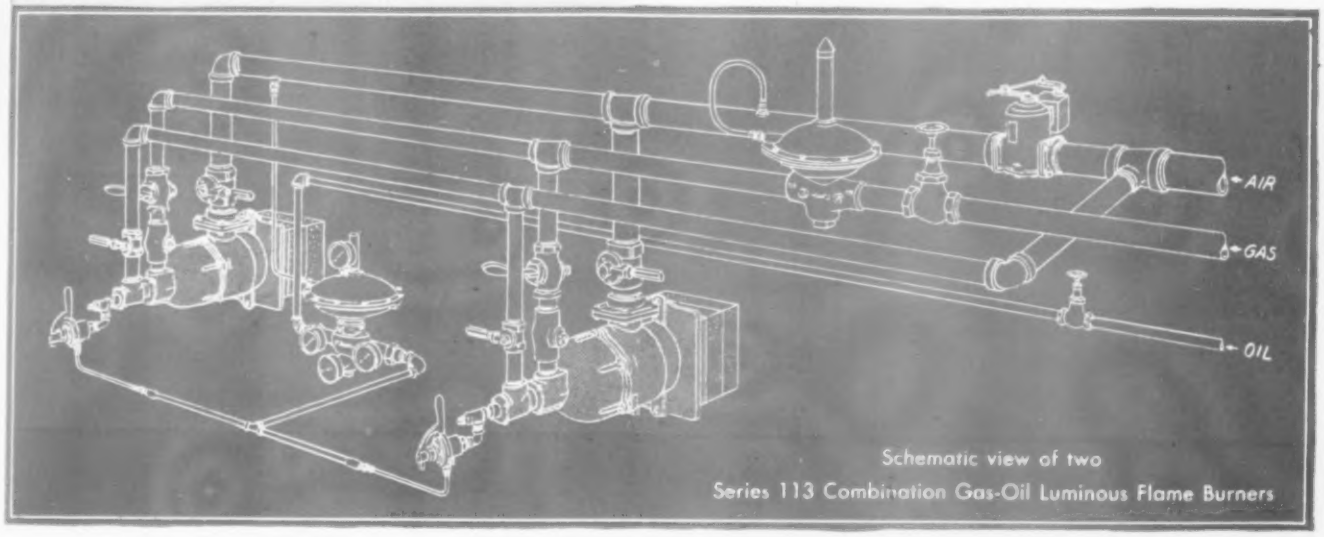
MAXIMUM EFFICIENCY WITH EITHER FUEL

SWITCH FUELS INSTANTLY

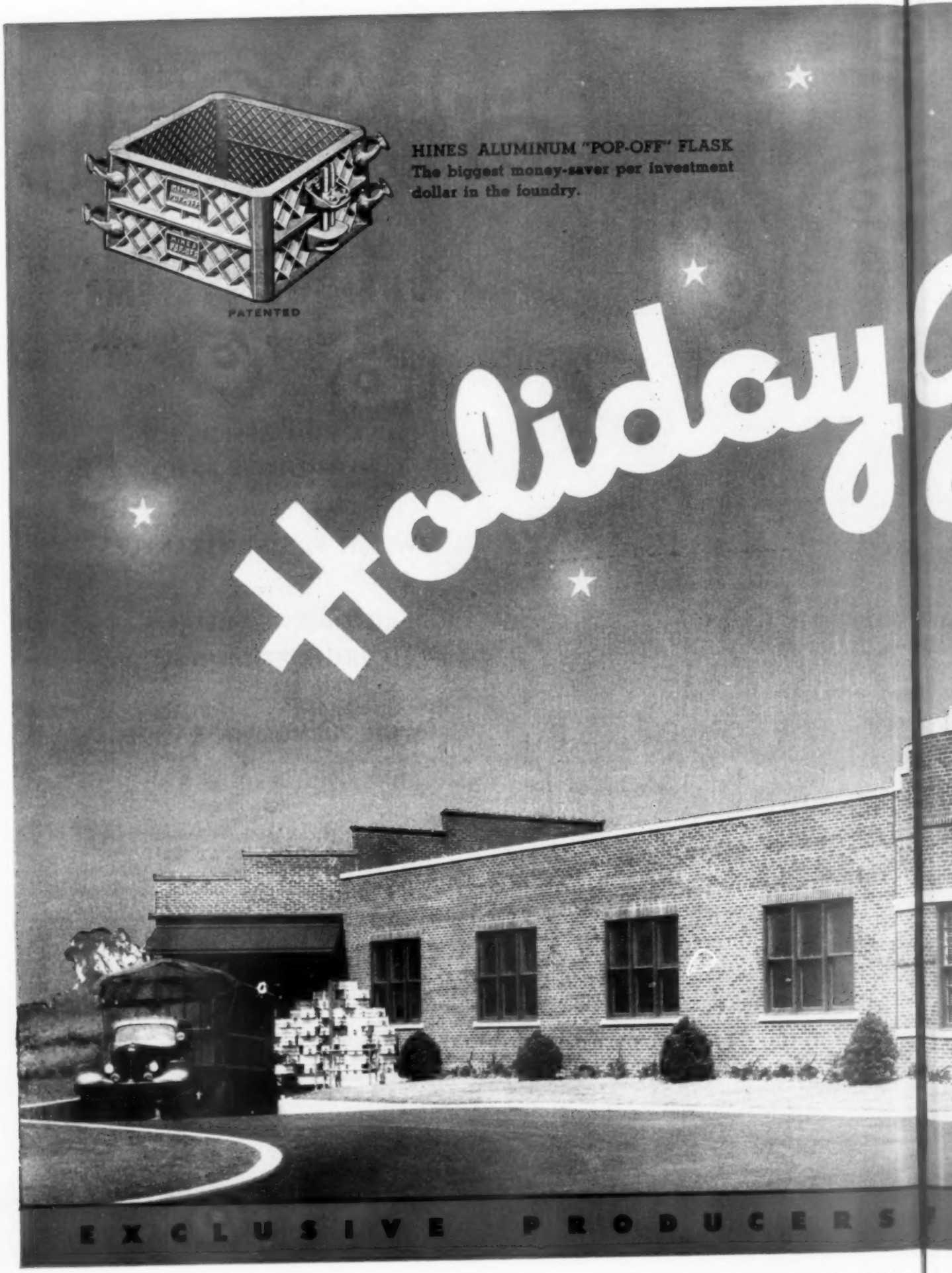
AUTOMATIC FUEL-AIR PROPORTIONING

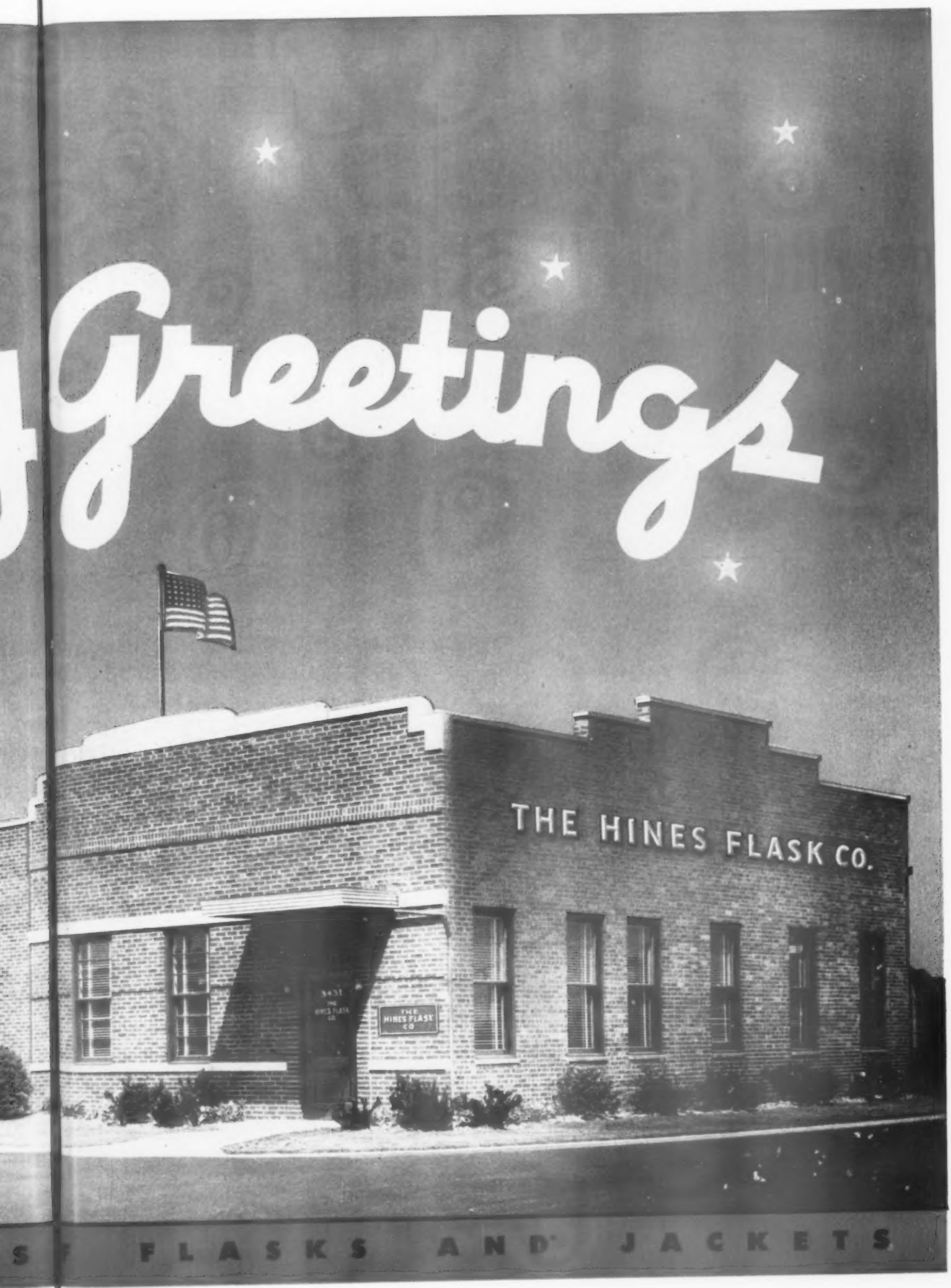
WIDE TURNDOWN RANGE

THE NORTH AMERICAN MANUFACTURING COMPANY
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL
BRANCH OFFICES with FIELD ENGINEERS in PRINCIPAL CITIES
CLEVELAND 4, OHIO



Schematic view of two
Series 113 Combination Gas-Oil Luminous Flame Burners


HINES ALUMINUM "POP-OFF" FLASK
The biggest money-saver per investment dollar in the foundry.
PATENTED
Holiday
EXCLUSIVE PRODUCERS


Greetings
THE HINES FLASK CO.
THE HINES FLASK CO.
FLASKS AND JACKETS

GAS

supplies

THE PRODUCTIVE FLAMES OF INDUSTRY

for

- core baking
- heat treating
- spheroidizing
- batch melting
- moisture control
- continuous copper brazing
- controlled atmosphere processing
- powder metal sintering

The *productive flames of industry* perform countless other duties. Practically every industrial heating requirement is a logical task for GAS, the versatile fuel, and for modern Gas-fired equipment.

FLEXIBILITY—CONTROLLABILITY—SPEED—UNIFORMITY—ECONOMY; wherever these qualities are required in process-heating, the dependable fuel is GAS. Inherent features of this fuel will suggest many additional industrial applications.

Day by day, successful applications of GAS eliminate production snarls in hundreds of manufacturing plants. Year after year, engineers and production managers specify GAS for increasing numbers of industrial heating installations. More and more the *"Trend is to GAS"* for all industrial heating.

Your local Gas Company solves industrial heating problems every day. Results of these studies will be helpful to you, too. An experienced Industrial Representative will recommend the proper use of GAS for your production process.

MORE AND MORE...

THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

Simplicity
FOUNDRY EQUIPMENT
For
Jobbing and Production Shops

Produce Cleaner Castings; Reclaim Valuable Sands; Cut Cleaning Room Costs; Eliminate Flask Breakage; Prevent Costly Shutdowns; and Increase Capacity with Reduced Man-power.

5-ft. x 10-ft. "B" Single Deck Sand Screen

3-ft. x 5-ft. "SS" Shake-Out in Production Shop

Simplicity foundry equipment includes Shake-outs, both Portable and permanent types; Knock-outs; Sand Screens; Portable and Semi-Portable Screening and Conditioning Units; Core Sand Lump Crushers; and Hot Castings Conveyors.

A typical expression from a Simplicity user: "We recently purchased a 6 x 8 Simplicity shake-out from the C. F. Braun Manufacturing Company of Alhambra, California. We are using this machine at present in our steel foundry and find the operation of this machine far surpasses your competitor's equipment.

Atlas Foundry & Machine Co.
Leo H. Long"

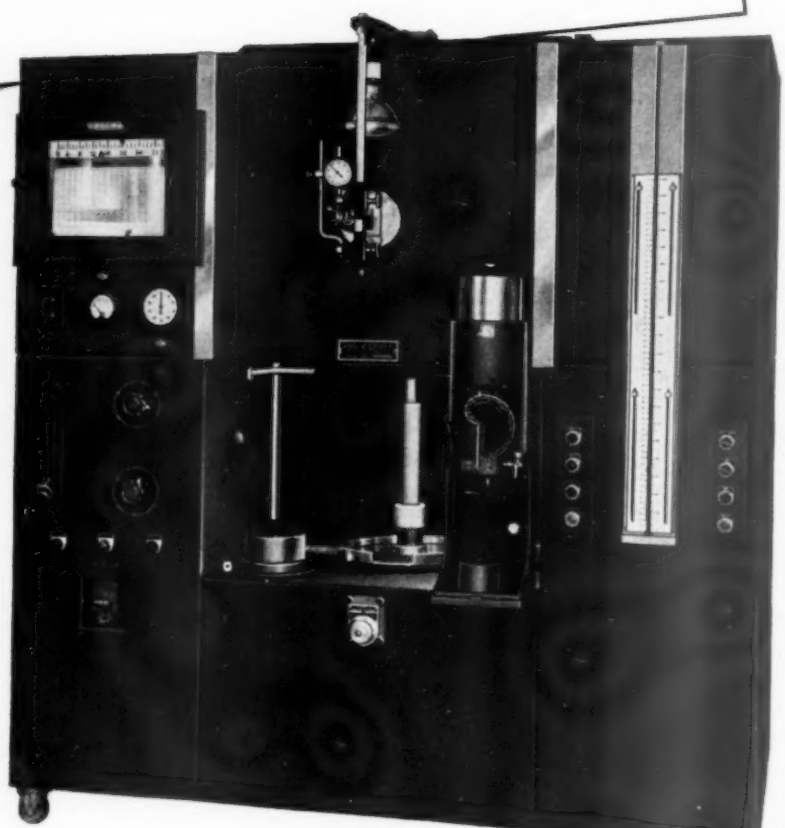
6-ft. x 17-ft. Dual Shake-Out in Jobbing Steel Foundry

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY
DURAND, MICHIGAN

Prevent *these Casting Defects*

BLOWS
BUCKLES
CUTS
DIFFICULT SHAKE-OUTS
DIRT
FISSURES
HOT TEARS
METAL PENETRATION
RAT TAILS
SCABS
VEINING



THE DILATOMETER SHOWS BY THESE TESTS HOW SAND AND COATINGS WILL BEHAVE AT POURING TEMPERATURES

COLLAPSIBILITY
DEFORMATION
EFFECT OF ATMOSPHERES
EXPANSION AND CONTRACTION
GAS PRESSURE
GAS VOLUME
PERMEABILITY
PROTECTIVE COATING
REFRACTORINESS
SPALLING
STRENGTH

OTHER CASTINGS CONTROL EQUIPMENT—Other Dietert equipment which is minimizing scrapped castings in foundries throughout the country includes the Moisture Teller, the Permeability Meter, the Universal Sand Strength Machine, and others.

LABORATORY SERVICE—The services of a complete modern sand laboratory, the consultation of foundry specialists, are always available to you for the solution of difficulties you may encounter from day to day in your own work. The time to stop trouble is when it begins. Send defective samples promptly to the Detroit Laboratories before losses build up. This is a nonprofit operation maintained solely to assist you.

2080

HARRY W. DIETERT CO.
9324 ROSELAWN AVENUE • DETROIT 4, MICHIGAN

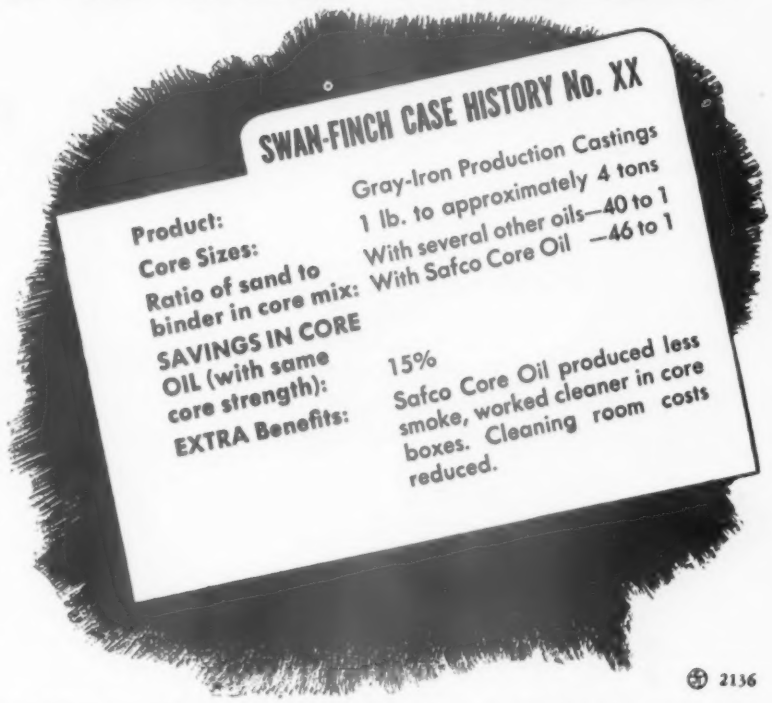
15% savings in core oil....

WITH NO LOSS IN CORE STRENGTH

You can benefit from the Swan-Finch service that made these savings possible — even though your problem is "different." In fact, it's because the Swan-Finch service engineer *recognizes* the differences in casting procedures that such savings are brought about.

All you do is call him in. He studies *your* binder problem first-hand. He recommends a binder *individually* for you. And it pays off. Swan-Finch files bulge with cases where individually recommended Swan-Finch Core Oils far out-performed oils bought on any other basis.

Ninety years of Swan-Finch experience back up the Swan-Finch man. He's familiar with most foundry conditions, practices and binder properties. His visit takes a surprisingly short time, entails no cost, no obligation — *no interruption in production.* Call in a S-F man. Coupon below does it.


SWAN-FINCH CASE HISTORY No. XX
Product: Gray-Iron Production Castings
Core Sizes: 1 lb. to approximately 4 tons
Ratio of sand to binder in core mix: With several other oils—40 to 1
With Safco Core Oil —46 to 1
SAVINGS IN CORE OIL (with same core strength): 15%
EXTRA Benefits: Safco Core Oil produced less smoke, worked cleaner in core boxes. Cleaning room costs reduced.

2136

SWAN FINCH EST. 1853

INDUSTRIAL PRODUCTS

SWAN-FINCH OIL CORPORATION

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Without obligating us, please send a Swan-Finch engineer to our plant.

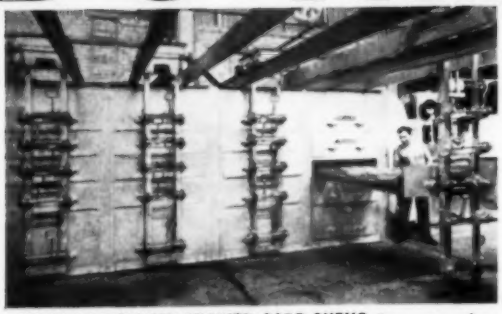
Name_____

Company_____

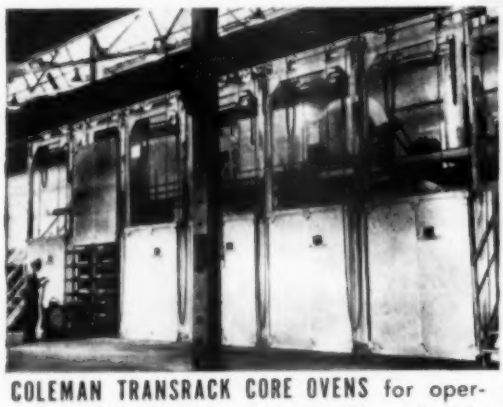
Address_____

City_____ State_____

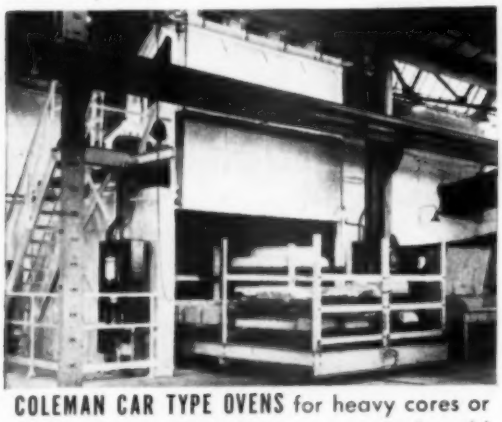
DO THE JOB BETTER



COLEMAN ROLLING DRAWER CORE OVENS for speedy baking of small and medium cores. Available in wide range of sizes and capacities.

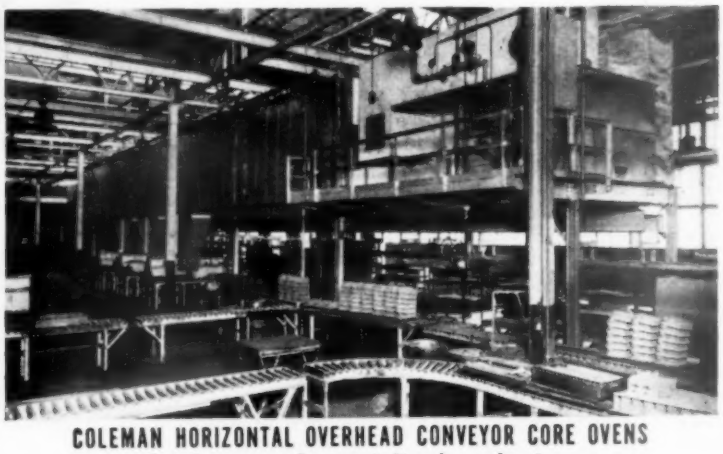


COLEMAN TRANSRACK CORE OVENS for operation with portable racks. Single or double rack capacity.



COLEMAN CAR TYPE OVENS for heavy cores or molds. Most of the large core and mold ovens in operation in every class of foundry production are Coleman Car Type Ovens.

COLEMAN TOWER CORE OVENS for high speed production. Patented Open Center permits loading from both inside and outside the Tower and increases loading accessability as much as 300% compared with other vertical oven designs.



COLEMAN HORIZONTAL OVERHEAD CONVEYOR CORE OVENS for large scale specialized production.

COLEMAN CORE and MOLD OVENS

The FOUNDRY

CLEVELAND 13

BUILDERS OF COLEMAN

RAND CHEAPER *With* COLEMAN OVENS

Conventional types and specially engineered installations for every requirement!

When you choose a Coleman Oven you profit by experience which includes over 40 years of specialization in designing and building foundry ovens, and more than 9,000 successful installations of all types.

Coleman Ovens are famous for *fast, perfect baking with less fuel and less labor.* They have proved of amazing value in every class of foundry work—gray iron, malleable, steel, alloy, aluminum, magnesium, etc.

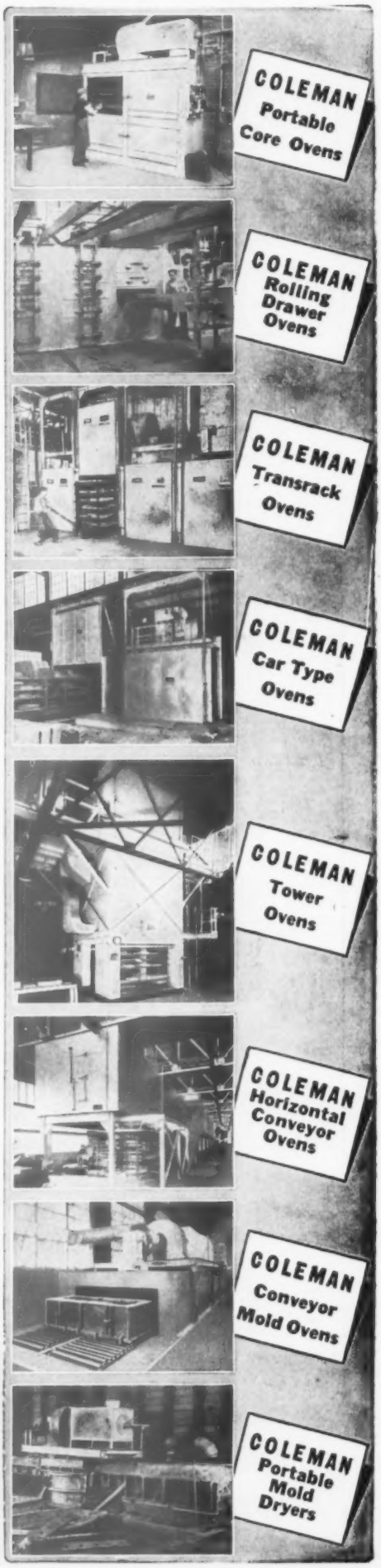
Coleman Ovens are built in all types and sizes to best meet each and every operating requirement. An investigation of Coleman Core and Mold Ovens to meet your own needs may disclose outstanding cost-cutting possibilities.

Perfect baking is guaranteed with all fuels. Coleman Ovens may be operated with any "automatic" fuel such as gas, oil, electricity, powdered or stoker coal, etc., whichever is most economical to obtain in your district.

Write for Folio of Coleman Oven Bulletins

More than **9,000** *Successful Installations*

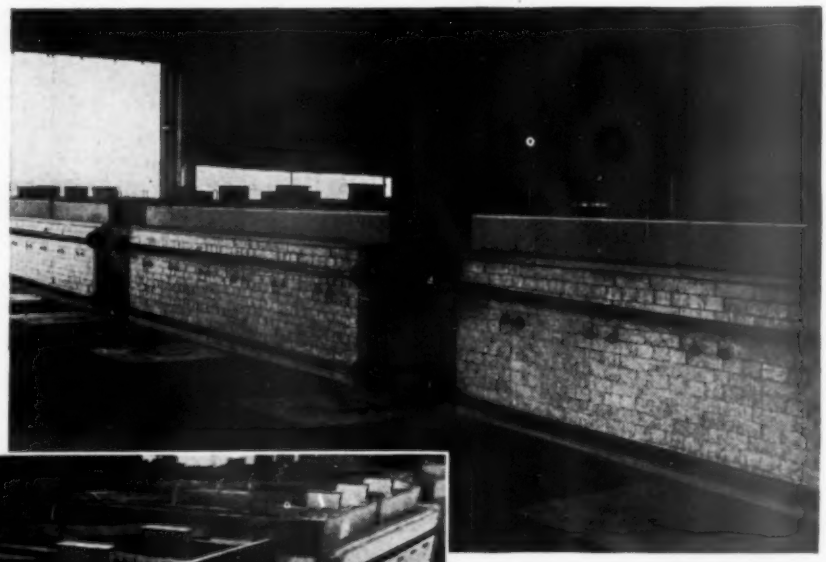
☆ WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS ☆



RY QUIPMENT *Company*
D 13 HIO, U. S. A.
MEMBER
IAN ND SWARTWOUT OVENS

Slow Cooling Pits

Controlled Cooling



Side View of AXLE
SLOW COOLING PITS

Top View of AXLE
SLOW COOLING PITS

By **LOFTUS**

The even distribution of heat in this type furnace prevents localized hot spots and the resulting washing and heavy slagging common in conventional type pits

THE ADVANTAGES of Slow Cooling upon Steel and Alloys are well known to the modern operator. The Loftus Pit-type Furnace illustrated above is designed for the slow cooling of axles. Each pit is a complete operating unit.

Loftus is fully equipped to offer the latest designs in Slow Cooling Furnaces and to meet your requirements, whatever they may be in the entire field of Metallurgical and Industrial Furnaces.

Designers and Builders of Melting, Heating and Industrial Furnaces for the Steel, Foundry, Aluminum and Brass Industries.

610 SMITHFIELD ST. **LOFTUS ENGINEERING** *corporation* PITTSBURGH, PA.

Designers and Builders — Engineers, Consultants, Contractors

Eliminate DUST

Mahon HYDRO-FOAM Collector Does it the Logical, Effective Way— Deposits ALL Dust Safely Under Water

The Mahon Hydro-Foam Collector will solve your dust problem permanently and economically . . . it is a standard unit which is manufactured in various capacities. These standard units can be manifolded together in batteries of two, three or four to a common sludge tank, and multiple batteries may be employed to handle any amount of air or any dust condition. Even the most minute particles of dust are effectively removed from the air and trapped under water . . . an automatic sludge removing device, which keeps the sludge tank clear, completes the simple process of dust elimination . . . a completely automatic system requiring less attention and less service. Have a Mahon engineer analyze your Dust problem today, and explain in detail the advantages and the effectiveness of the patented Hydro-Foam principle.

Address INDUSTRIAL EQUIPMENT DIVISION

THE R. C. MAHON COMPANY

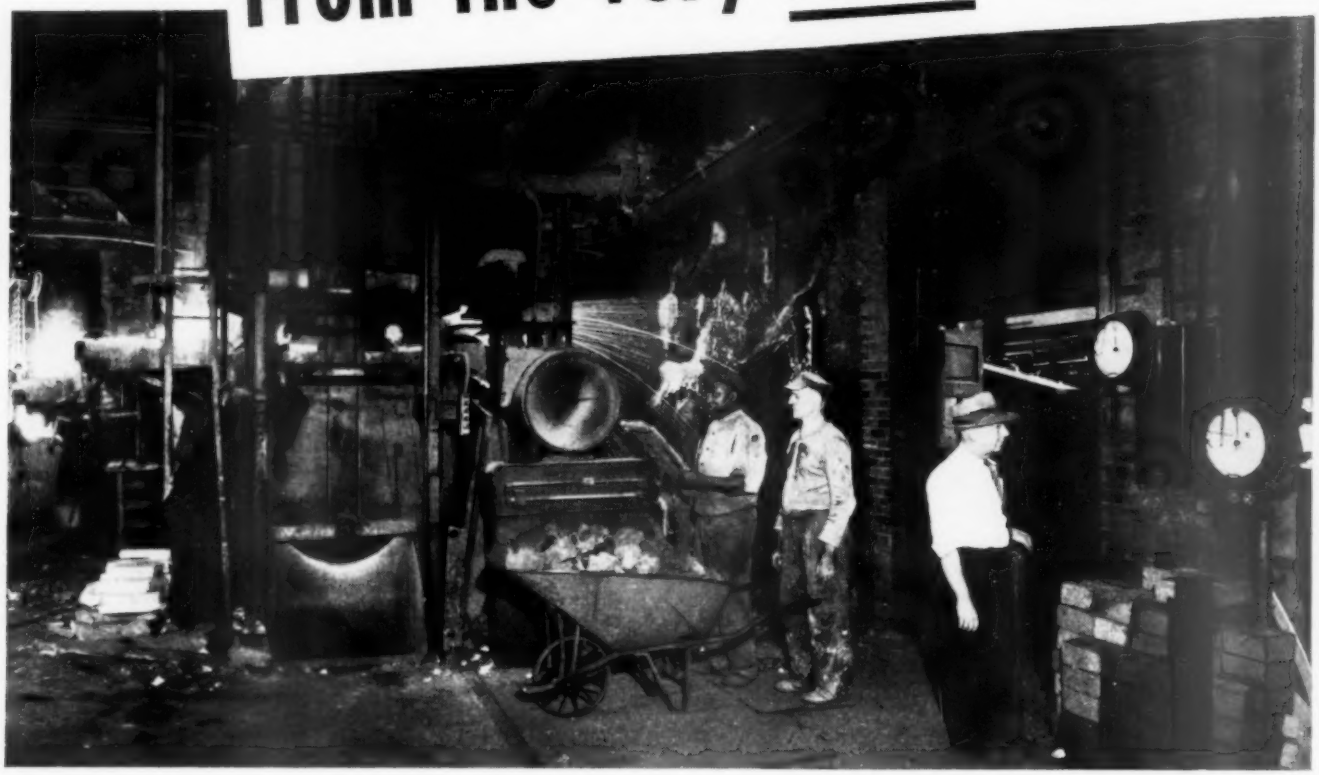
Detroit 11, Michigan • Western Sales Division, Chicago 4, Illinois

Engineers and Manufacturers of Dust Collecting Systems, Complete Finishing Systems, Annealing Ovens, Core Ovens, and many other Units of Special Production Equipment.

On this page are shown batteries of two and three Mahon Hydro-Foam Dust Collectors. The illustration shows 24 grinders served by a Mahon Hydro-Foam System which handles 725,000 cubic feet of air per minute.

MAHON

Get FIRST-GRADE Castings From the very FIRST Tap...



Foxboro Air-Weight Control at Forest City Foundries Co., Cleveland, Ohio. Entire installation requires but a few hours' work by an experienced pipefitter.

...with Foxboro Air-Weight Control!

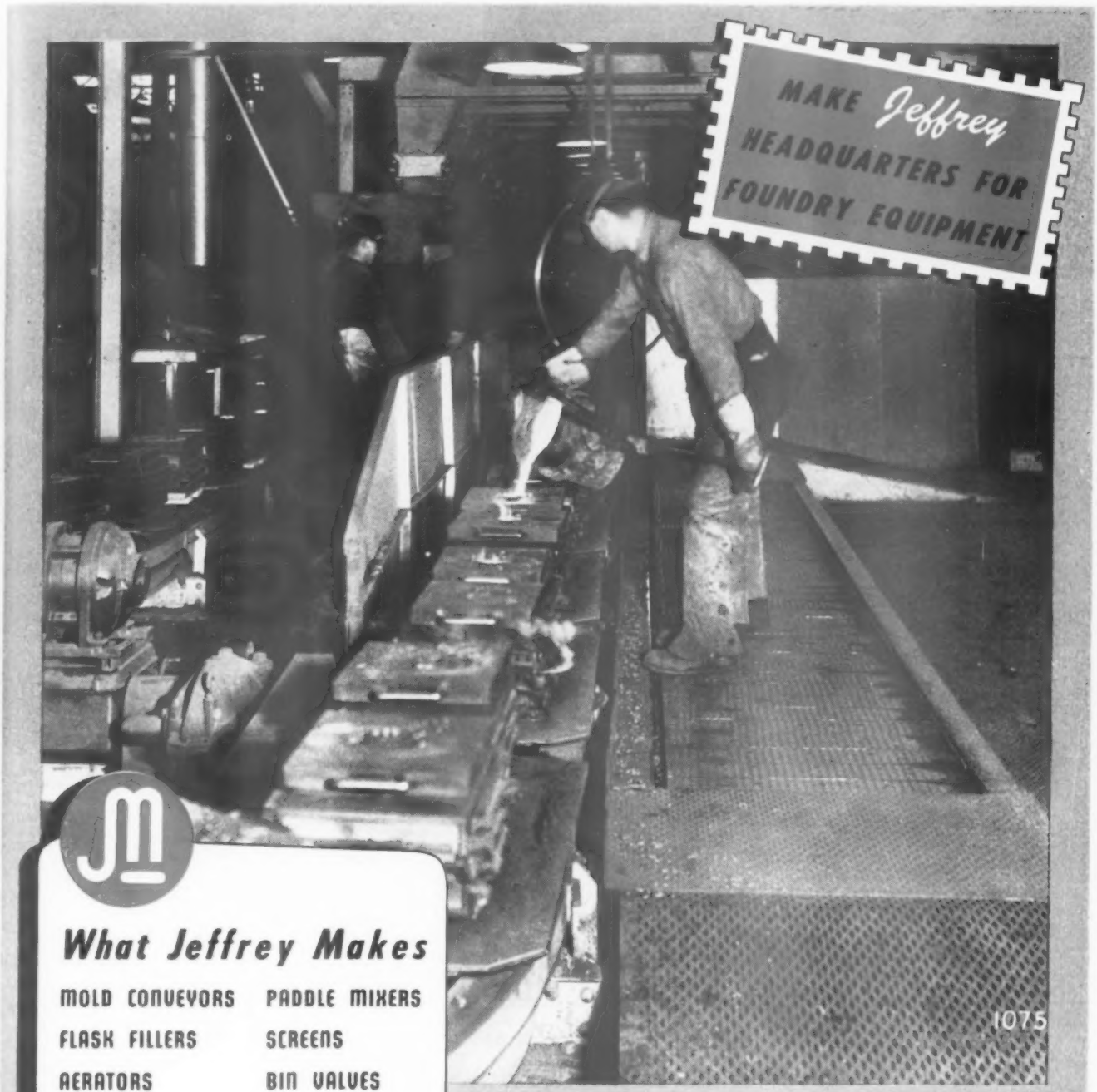
No longer need you pig the first tap of any melt . . . no longer lose output on bad pouring days! Foxboro Air-Weight Control can stop these losses in your foundry, just as it is doing in hundreds of others.

Here's how. The Foxboro Air-Weight Controller controls cupola blast by *weight* of air, instead of *volume*. Automatically, it exactly maintains desired combustion ratio, regardless of changes in windbox pressure, blast temperature or barometric pressure.

Heats are uniformly hotter without burning . . . metal characteristics are improved . . . pigging is eliminated. Every pour from start to finish gives flawless first-grade castings. And you can hold a better iron-coke ratio, as well!

Bulletin B-268-1 gives full details of this easily-installed production booster. Names of users in your vicinity will be supplied on request. Write **The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U. S. A.** Also Montreal, Canada. Branches in principal cities.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**



What Jeffrey Makes

MOLD CONVEYORS
PADDLE MIXERS
FLASK FILLERS
SCREENS
AERATORS
BIN VALVES
SANDITIONERS
CONVEYORS
BUCKET ELEVATORS

A Modern Installation
Where Pourers Ride Along
With The Mold

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

907-99 North Fourth St., Columbus 16, Ohio

Baltimore 1 Buffalo 2 Cleveland 13 Harlan Milwaukee 11 Pittsburgh 22
Birmingham 3 Chicago 1 Denver 2 Houston 5 New York 7 St. Louis 3
Boston 16 Cincinnati 2 Detroit 13 Huntington 19 Philadelphia 3 Salt Lake City 1 Scranton 3

IRONTON BERLITE

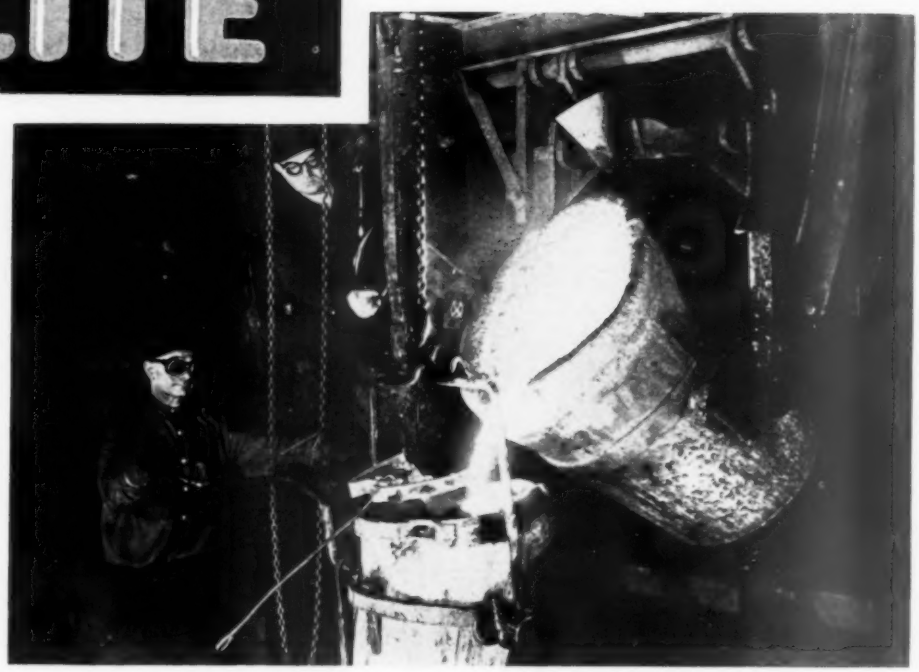


Photo Courtesy "Industry and Power"

Ask us for service data on

"IRONTON BERLITE"

IRONTON BERLITE SUPER-QUALITY REFRACTORY MATERIAL FOR FOUNDRIES

"Ironton Berlite" is being widely used as a mud or tamped lining in ladles handling cupola iron. It gives about 10 times the service of ordinary ladle lining materials and slagging in the ladle is practically eliminated.

"Ironton Berlite" when used as a mortar, prolongs the life of cupola blocks in the well and melting zone. Also useful in malleable iron furnaces.

Address Box 309

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

WEST COAST REPRESENTATIVES

Nelson G. Phelps
Carl F. Miller and Co. Inc.

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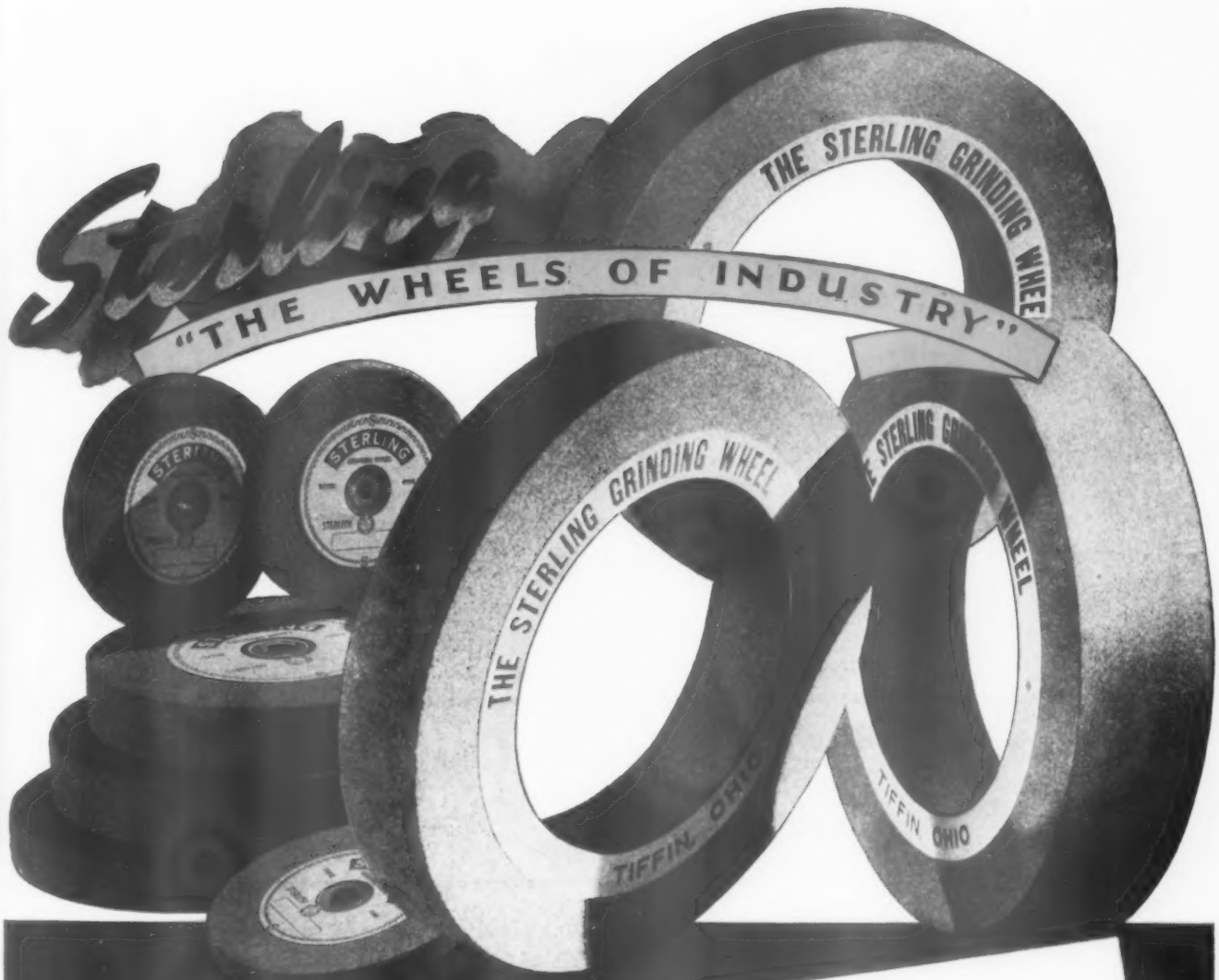


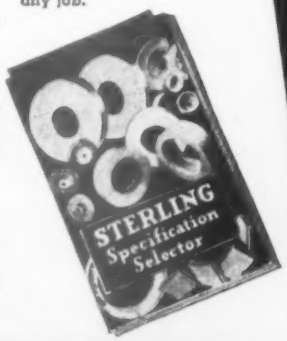
Send for the Specification Selector Today!

STERLING'S "Wheels of Industry" have successful grinding built into them . . . there is the correct grain size, structure, bond, size and shape to do either the ordinary or unusual job.

For over sixty years, the "Wheels of Industry" have been solving difficult grinding problems—you "cash in" on this experience when you use Sterling Grinding Wheels.

Sterling's laboratory technicians and engineers are ready to produce for you the wheel for the job that "can't be done." Write us for this service . . . there is no obligation.

◆ Ask for your free copy of this handy grinding reference . . . tells the correct wheel to use for almost any job.

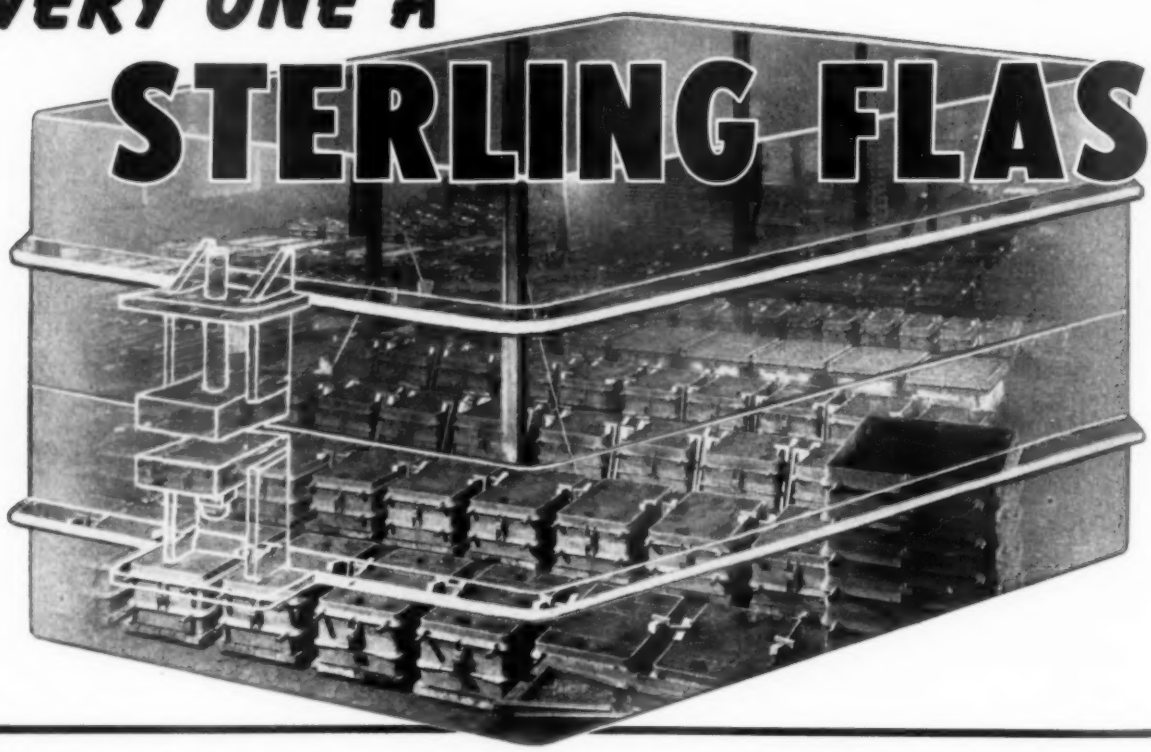


• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

EVERY ONE A STERLING FLASK



Foundries have learned that it pays to *Standardize* on *Sterlings!*

Sterling No. 116A Wheelbarrow with 3/16" steel plate re-inforcement for extra hard usage.

Sterling Style "LL" Flask with angle re-inforcement and two-man lift handles.

The vast majority of American Foundries . . . more than 4000 of them . . . have adopted Sterling Steel Flasks for greater efficiency, longer life and more profitable foundry operation. And these foundries continue to specify Sterlings whenever more flasks are needed. The reason is instantly apparent when you consider that Sterlings have the strength and rigidity to resist distortion and to take hard, every-day punishment in stride. All-steel . . . all-welded . . . Sterling Flasks are fabricated into one solid, rigid piece . . . capable of withstanding tremendous pressures. They retain their rigidity and accuracy year-in, year-out.

Consult Sterling the next time you are in need of flask service.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

A5032-TP

ENGINEERED TO

1. SAVE MONEY
2. REDUCE FATIGUE
3. SAVE TIME

EXPERT ENGINEERING of ROURA Self-Dumping HOPPERS gives maximum flexibility in materials handling. Efficient for any bulk material—hot, cold, wet or dry.

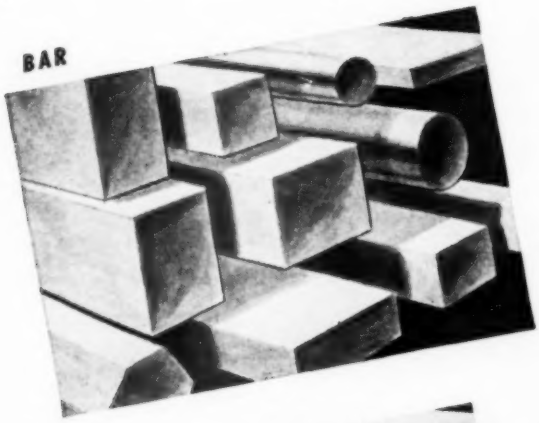
STURDY, ALL-WELDED CONSTRUCTION assures long, rugged use *without warping* . . . smooth seams mean clean, rapid dumping. Fits any standard type platform or fork lift truck.

OPERATING EASE saves time and effort . . . makes carrying and dumping safe. *One simple manual motion* releases hopper to automatically empty, return and lock . . . ready for the next load. EXPERIENCE RECORDS SHOW 50% CUT IN FATIGUE!!

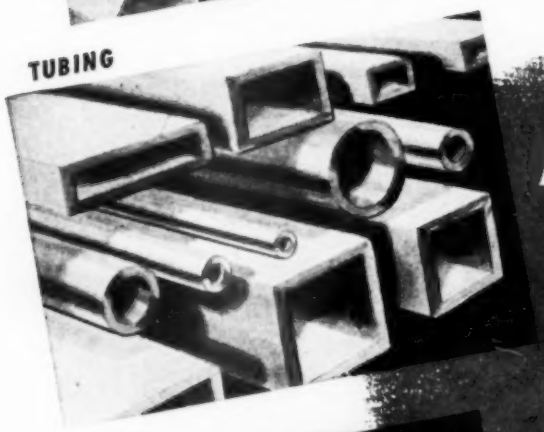
Order one on a 30-day trial basis. Standard (1 cu. yd.) Model, $100.00 FOB Detroit. *Write for new detailed Bulletin.*

ROURA
SELF-DUMPING
HOPPERS

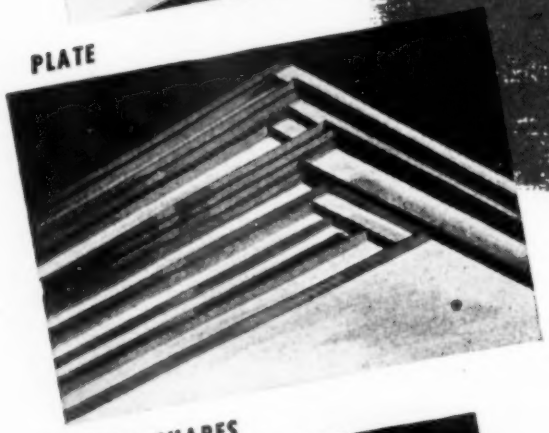
ROURA IRON WORKS
1408 WOODLAND AVENUE • DETROIT 11, MICHIGAN

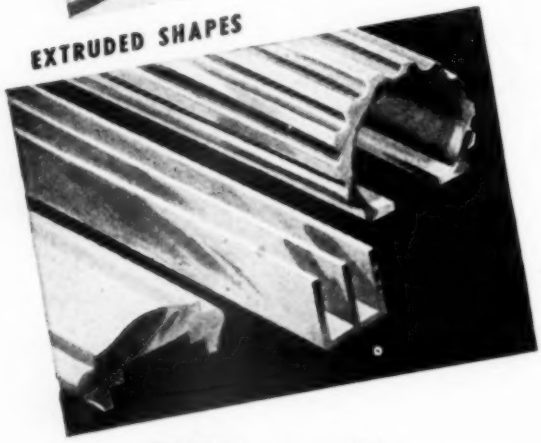


ALUMINUM MILL PRODUCTS



AVAILABLE TO FABRICATORS right now!





Consider your aluminum needs—then get in touch with your nearest War Assets Administration Regional Office to see if we can fill your requirements. Even your highly specialized requirements might be filled from WAA surplus stocks. It costs nothing to find out. Orders are filled quickly and without fuss.

All metals are sold under existing priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the materials offered herein.

Exporters are considered as wholesalers in the purchase of surplus property. Any question on export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

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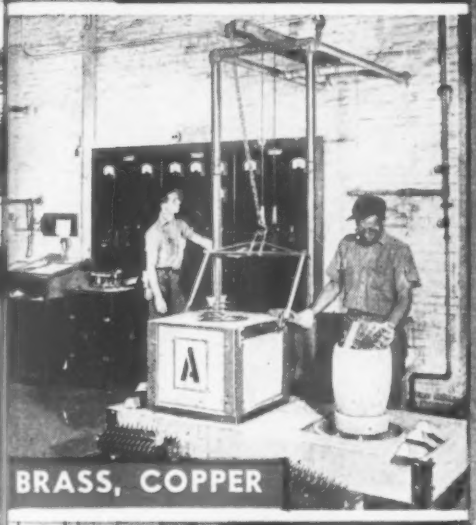
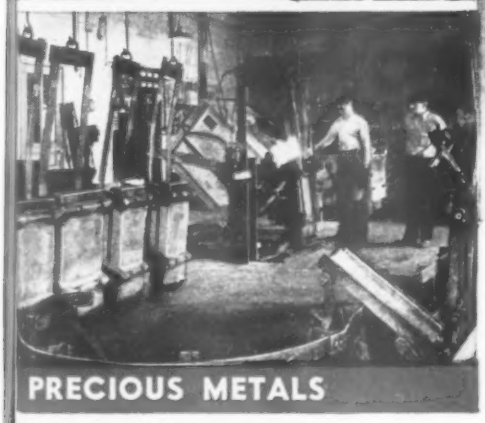
157-9

THE FURNACE YOU CAN TRUST *with* $150,000





87

Gold — 4,000 ounces of it — is melted in a little high-frequency furnace. Because of its fast melting, freedom from impurities, exact yield, and high metal recovery, the Ajax-Northrup furnace is used in nearly every important mint in the world to melt gold, silver and coin metals.

Whether you are melting 4,000 ounces of gold — or 1,000 pounds of steel — or 200 pounds of tough-to-control high-copper bronze — the Ajax-Northrup furnace is the most dependable for duplicating analyses time after time with low loss of valuable constituents.

Ajax-Northrup furnaces are fast, always with perfect control. There's no time for contamination or oxidation. All the heat is produced right in the charge, and it stirs as it melts. High-frequency furnaces are ideal for small or large jobs, steady production or "rush" orders alike. Available in capacities from 8 oz. to 8 tons, with linings and pouring methods to fit all metals and alloys. Write Ajax for more facts.

Send for Bulletin 27. It shows many ways you can use induction heating and melting to save time, produce more accurate results, reduce spoilage, and do heating jobs that couldn't be done before.

AJAX NORTHRUP *Since 1916*

AJAX ELECTROTHERMIC CORP., AJAX PARK, TRENTON 5, N. J.

HIGH-FREQUENCY HEATING · MELTING

AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

ASSOCIATE COMPANIES

17 DIFFERENT FOUNDRY UNITS

Served by KIRK AND BLUM VERSATILE DUST CONTROL APPLICATIONS

Controlling the dust in seventeen different foundry units called for a highly specialized system. Kirk & Blum Engineers solved this problem with a three-way system utilizing Rotoclones, Cloth Filters and Centrifugal Type Collectors.

In the foundry proper, which includes all types of sand-handling equipment, Roto Clones did the job while cloth-type filters were used in the cleaning buildings. In the pattern shop a centrifugal type collector and storage bin was installed for shavings and dust collection.

Another problem presented itself and was overcome. Because of crane interference, all discharge pipes had to pass vertically along column centers with special transitional shapes.

If you want top efficiency and economical operation in dust control for your foundry, get the unbiased facts and expert counsel of Kirk & Blum Engineers. For further information write to

The KIRK & BLUM *Mfg. Co.*
2808 SPRING GROVE *Ave.* CINCINNATI 25, OHIO

KIRK AND BLUM

A-O RUBBER FRAME GOGGLES

Have Sweep-Vision Lens

Provide Protection against Chemical and Dust Hazards

The new A-O Rubber Frame Goggle has a single large acetate lens which provides exceptional wide-angle vision. Frame is molded from non-irritating, acid-resisting synthetic rubber, which will stand up under long, hard wear. It is scientifically designed to conform to face contours, providing an acid- and dust-tight fit. Cushioned and ventilated for maximum comfort. May be worn over personal prescription glasses. Especially recommended for maintenance men on acid lines and storage batteries; for workers on metal plating baths, foundry shake-out, railroad car and coal handling apparatus cleaning, and in ship holds and engine cabs where dust is a dangerous factor. Send for bulletin which fully describes the various outstanding features of this new A-O development.

American Optical
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SOUTHBRIDGE, MASSACHUSETTS
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DOWMETAL

PATTERN PLATES

(MAGNESIUM)

5/16"—⅜"—½"—⅝"—¾"—1" Thick

In Stock for Immediate Delivery

Freeman Dowmetal Plates are uniform in thickness, with a sand-blasted, velvet finish, ready to mount patterns.

LIGHTER—33% lighter than aluminum.

STRONGER—than either rolled or cast aluminum. Tensile strength 40,000 lbs. per square inch.

MACHINABILITY—machines better than any other metal, drills and taps easier than aluminum.

ACCURATE—held to parallel tolerance of .0025".

COST—no more than rolled plates or many cast plates.

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CHECK ADVANTAGES FOR LARGE COPE AND DRAG PLATES

The Freeman Supply Company

Pattern Shop & Foundry Supplies & Equipment

Mahogany and Pine Pattern Lumber

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LIQUIDATE

YOUR DUST AND FUMES!

We do mean "liquidate"—in the sense of finality, and we refer to the Schneible wet method for eliminating contaminated air from foundries.

The costly effects of dust and fumes on working efficiency and foundry output are such that it is definitely profitable to install the most efficient equipment for dust control throughout the plant, with due consideration for operating and maintenance costs. Clean air pays dividends.

Schneible Multi-Wash equipment has proved so effective for foundry dust and fume control that it is used by leading automotive and farm equipment production foundries and hundreds of jobbing foundries—large and small.

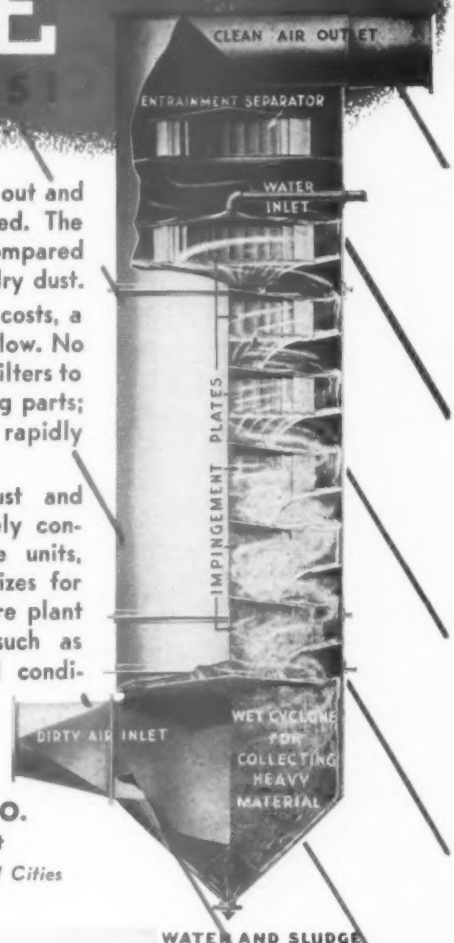
For disposal of the dust, nothing equals the Schneible wet method. Schneible Multi-Wash Collectors use water (oil for magnesium) to wash dust and fumes from the contaminated air. The collected matter, as sludge, flows to a dewatering tank (or waste). The sludge is settled out and the cleared water is re-circulated. The sludge is easily disposed of, as compared to bothersome accumulation of dry dust.

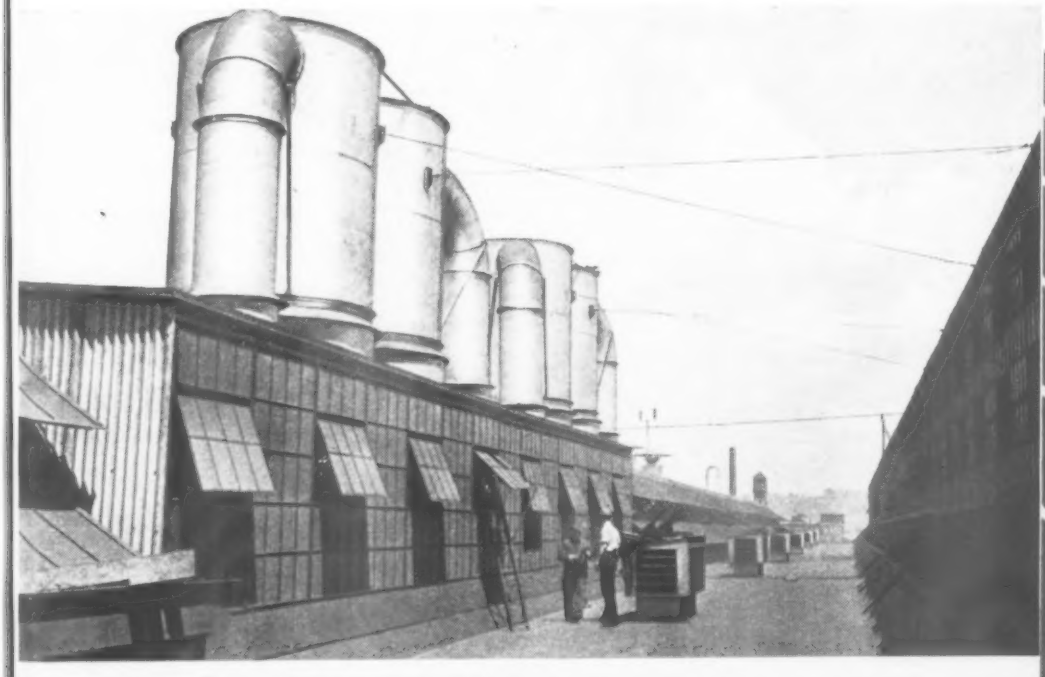
In operating and maintenance costs, a Schneible system is the absolute low. No attendance required. No bags or filters to shake daily or replace. No moving parts; nothing to break, clog, burn or rapidly wear.

Practically every foundry dust and fume condition can be effectively controlled with standard Schneible units, which are made in types and sizes for every foundry need; for the entire plant or for individual operations, such as shakeouts, cleaning rooms, sand conditioning and core grinding.

May we send you informative bulletins?

CLAUDE B. SCHNEIBLE CO.
2827 Twenty-fifth St., Detroit
Engineering Representatives in Principal Cities





Four Schneible 20,000 c.f.m. Senior Multi-Wash Collectors at one of the largest production foundries, which has since ordered two more collectors.

SCHNEIBLE

LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

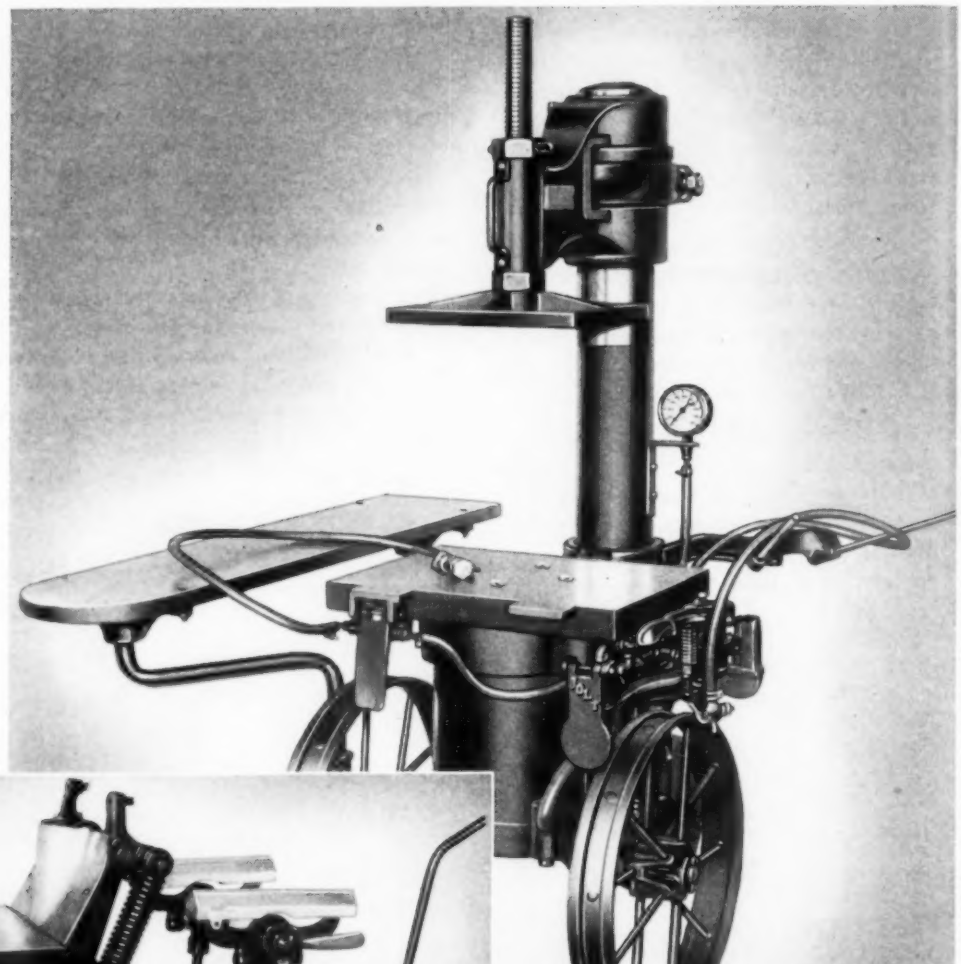
ARCADE *Foundry Equipment*

CAN "TAKE IT" DAY IN AND DAY OUT WHEN PRODUCTION PRESSURE IS AT ITS PEAK.

No. 72-28
JOLT SQUEEZER
(Post Type — Portable)

A Heavy Rugged Machine for hard continuous use — valves conveniently located — a high production unit.

10″ Squeeze Cylinder — 4″ Jolt Cylinder.



No. 41
JOLT ROLLOVER MACHINE
(Hand Roll — Foot Draw)

The 14″ Square Table is cast steel. Also used for small Molds. 3″ Jolt Cylinder.

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From Coast to Coast*,
Extensive Stocks of
B&A Reagents and C. P. Acids
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To provide direct, personalized service for laboratory chemical users everywhere, the Baker & Adamson Division of General Chemical Company has its *own* chain of regional warehouses from coast to coast. Each is a strategic supply center carrying extensive stocks of B&A Reagents, C. P. acids, and other purity products for prompt delivery.

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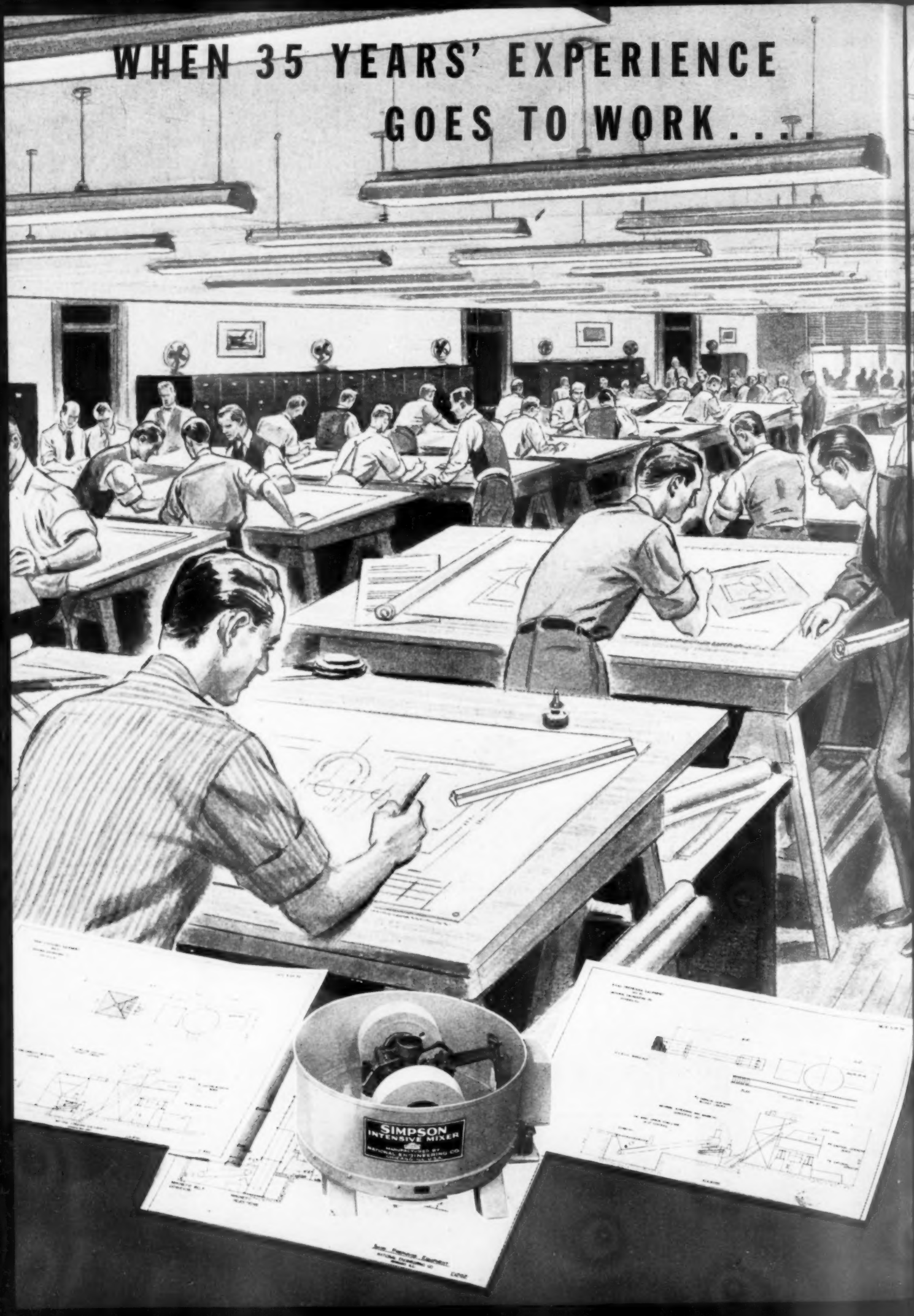
WHEN 35 YEARS' EXPERIENCE GOES TO WORK . . .



. . . A STRAIGHT LINE TO SAND CONTROL EFFICIENCY

NATIONAL *Engineering Service*

FOUNDRY Sand Control Engineering has been the special province of National Engineers for thirty-five years. During this time they have designed and engineered sand systems and equipment for hundreds of foundries, large and small, of all types: magnesium, aluminum, iron, steel, brass and bronze. They have helped foundries produce the highest quality castings at the lowest net cost per ton.

A broad background of practical foundry experience and years of concentration on the proper solution to foundry sand problems equips National Engineers to layout, design and build the right system for the special requirements of any foundry. This means top operating efficiency is achieved — and maximum production with savings in time, labor, power and materials possible in nearly every case.

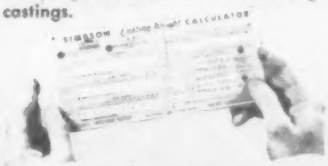
If you are seeking the shortest route to proper sand preparation, handling, reclamation, storage and control let National Engineering experience help you. Whether it is a problem of today or part of your long range planning, a National Engineer will gladly work it out with you.

FIELD SERVICE

National engineers are on the job constantly helping foundries solve problems of sand handling and control on construction, maintenance, repair or new requirements.

CASTING WEIGHT CALCULATOR

Many thousands of these simple, easy-to-use calculators have been distributed throughout the foundry industry. They help save time and avoid guesswork in estimating castings.



MOLDING COST CALCULATOR

This handy Simpson Molding Cost Calculator computes molding cost per ton of castings—number of molds needed for certain number of castings—weight of metal needed to pour remaining molds and cubic content of the mold. Free to foundrymen—write for yours.

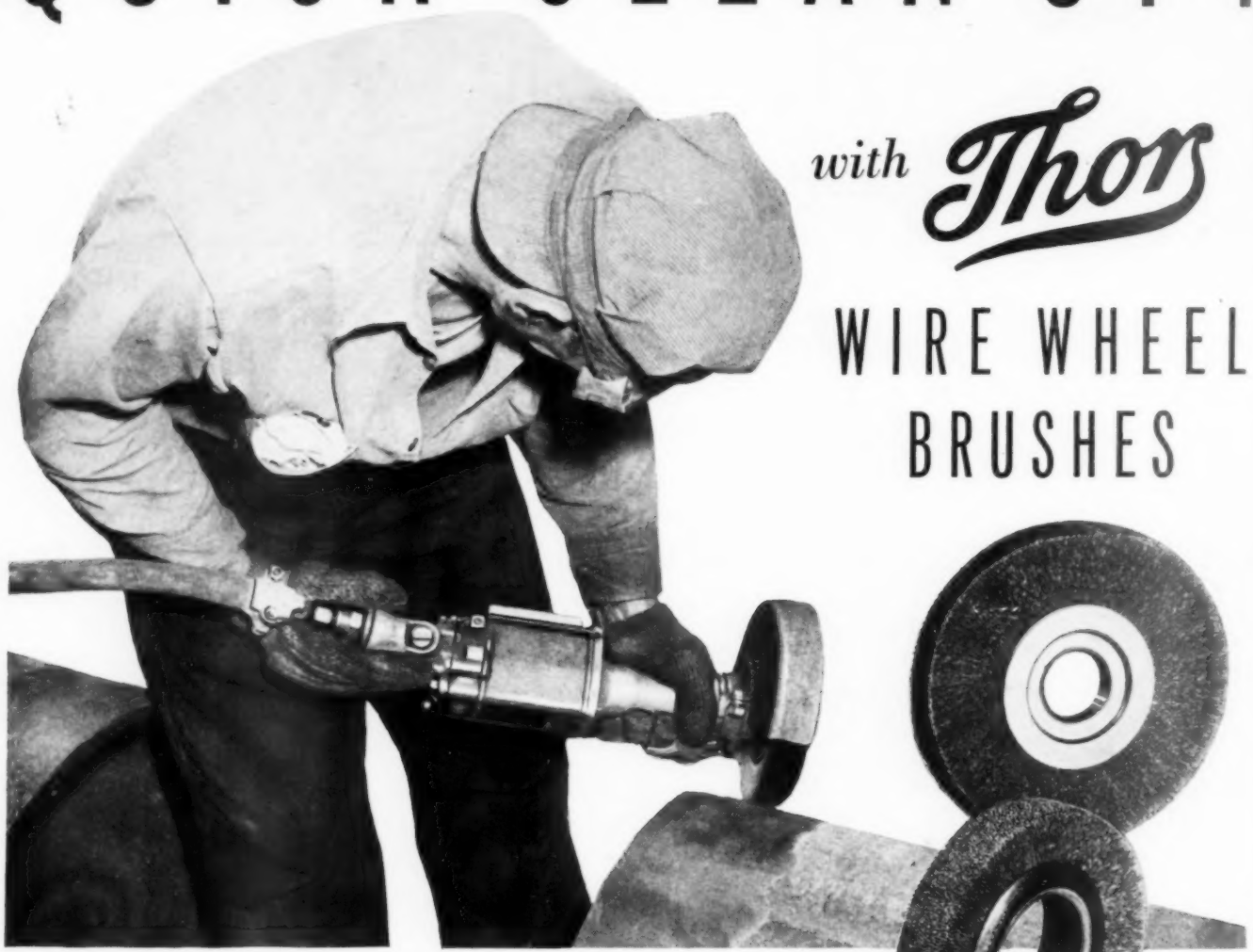
SIMPSON INTENSIVE MIXERS

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

QUICK CLEAN-UP!



with Thor

WIRE WHEEL BRUSHES

Made for long, heavy duty service in removing rust—paint—scale—burrs —carbon and other material . . . and for cleaning, roughing, polishing and burnishing. THOR wire wheel brushes are available in sizes from 4″ to 12″ diameter in single-unit, arbor hole adaptor or metal-center sectional type. Brush sections are heavily filled with Double-Durable special crimp wire in gauges up to 36. These modern brushes will operate efficiently on portable and stationary equipment with spindle speeds up to 6000 R.P.M. Your nearby Thor Distributor carries a complete stock.

INDEPENDENT PNEUMATIC TOOL COMPANY

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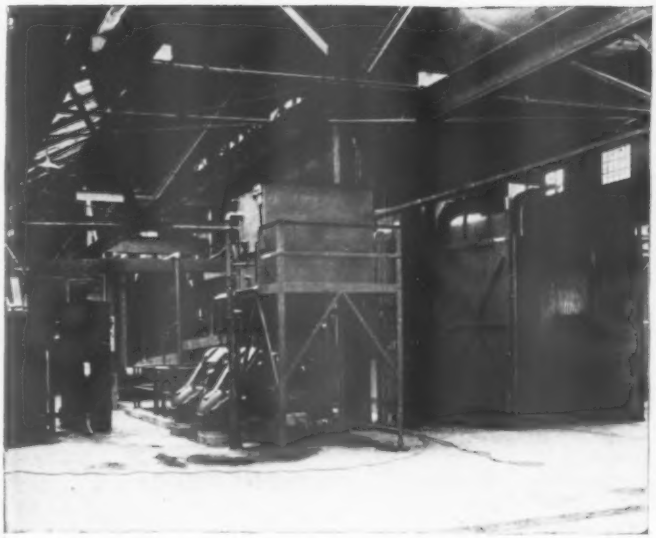
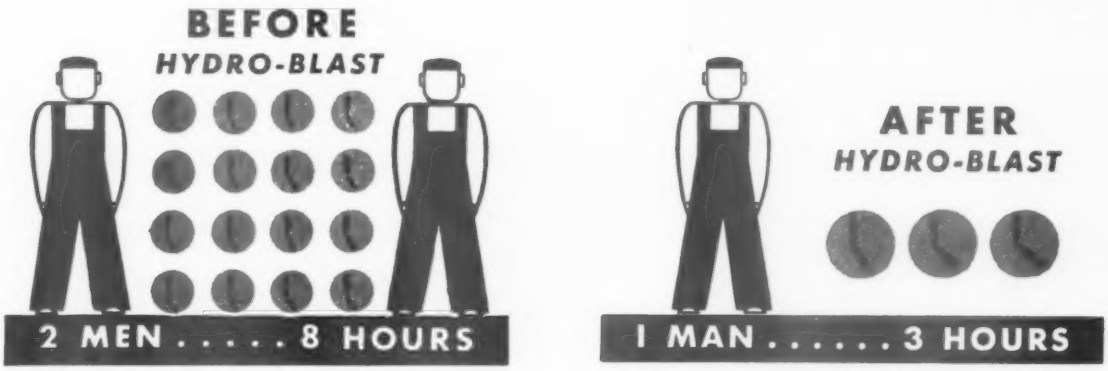
Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



How National Transit

BLASTED CLEANING COSTS



FROM 16 man-hours *to only 3 man-hours:* that tells what happened to cleaning costs at National Transit Pump and Machine Co., Oil City, Penna., when Hydro-Blast was installed. The first casting cleaned was a large brass cylinder that formerly required two men working 8 hours to decore and surface clean. One Hydro-Blast operator did a far better job in only 3 hours. Plus benefits include elimination of dust, comfortable room temperatures and important economies through sand recovery.

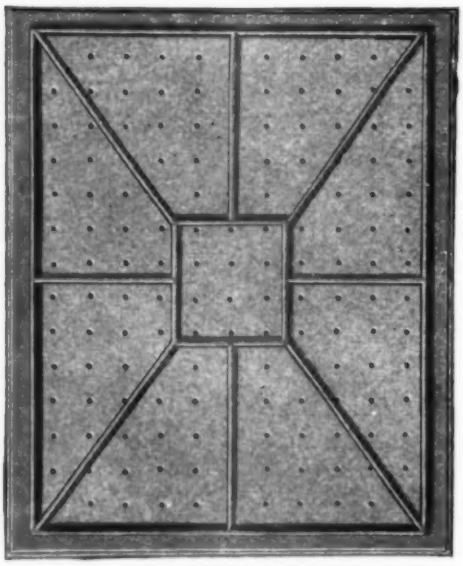
National Transit manufactures Transit pumps and pipe line tools, Transit gas engines and compressors—pours both gray iron and non-ferrous metals. The result described is typical of their experience with Hydro-Blast—to their warm satisfaction.

You can win similar savings and advantages for your own business. It's easy to find out how—write Hydro-Blast.

HYDRO-BLAST

2550 N. WESTERN AVENUE · CHICAGO 47, ILLINOIS

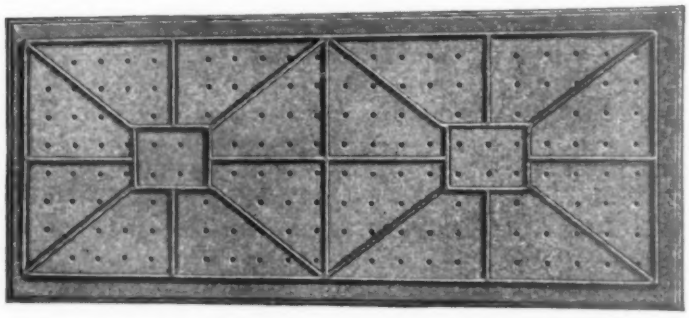
"DIAMOND" CUSTOM-BUILT CORE PLATES



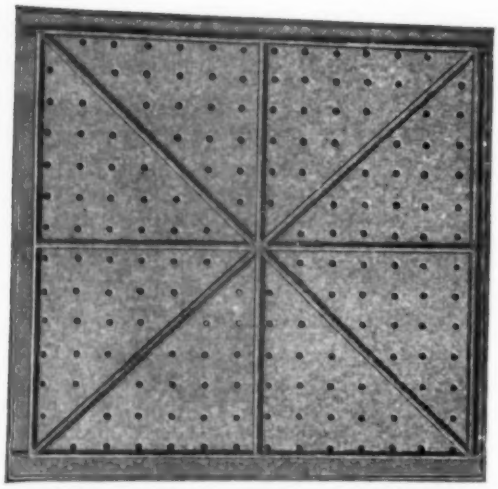
STYLE CP-3 — This type reinforcing on "square" plates for loads up to 1200 lbs. Typical sizes run 40" x 50" and 36" x 60".

CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!

Less baking time with Diamond Plates . . . because sturdy construction with light weight is achieved. They heat up and cool more quickly. Fabricated from ½" or heavier plate as indicated to meet load requirements, users acclaim the long-life and uniform quality of Diamond Plates. Available in special and standard sizes to suit your exact requirements.



STYLE CP-2—For long and narrow cores and loads to the 1200 lb. range. Note web-bracing construction.



STYLE CP-1 — This construction used on plates in the 30" x 30" range for core loads up to 200 lbs.

HOW TO ORDER DIAMOND CORE PLATES

Since we recommend "job fitted" plates for real production efficiency, we suggest your telling us *how heavy your core loads will be* and the *approximate overall plate size*. We will design reinforcing accordingly, and quote in terms of plates best suited to your needs.

DIAMOND

Telephone 2553 — CLAMP AND FLASK COMPANY — Richmond, Indiana

Designers of CORE PLATES, JACKETS, BANDS, FLASKS *since 1889*

3 OUTSTANDING ACHIEVEMENTS of NATIONAL SMELTING RESEARCH

TERNALLOY
ALUMINUM ALLOYS

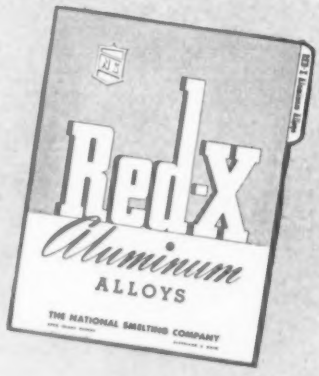
exceptionally high strength on natural aging; dimensional stability; excellent machinability; good corrosion resistance.

ALLCAST
ALUMINUM ALLOY

a high quality, general purpose casting alloy that provides superior mechanical properties with a worthwhile saving.

RED-X
ALUMINUM ALLOYS

for critical castings. Flexible composition permits adaptability to the particular casting requirement.

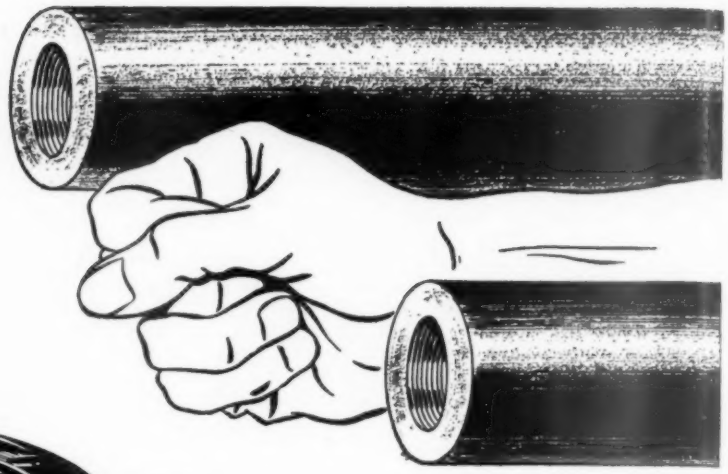


Write for illustrated booklets on these aluminum alloys — products of National Smelting research.

THE NATIONAL SMELTING COMPANY
6706 GRANT AVENUE • • CLEVELAND 5, OHIO

NATIONAL SMELTING

back of the steels that fight friction . . .



INTERNATIONAL GRAPHITE ELECTRODES

Producers of high quality alloy steels for anti-friction bearings are among the electric furnace operators that regularly use International Graphite Electrodes . . . and have for many years. They have proved to their own satisfaction in the severest tests of all — actual furnace operation under a wide range of production requirements—that International Electrodes have the right combination of physical, electrical and chemical properties for quality steel production.

Check over the qualities *you* want in electric furnace electrodes—the properties you'd see they had if you were *making* electrodes as well as *using* them. You'll find as others have, that International Electrodes fully measure up to every exacting standard by which acceptable electrodes are judged.

For all around satisfaction and economical performance, specify "International" the next time you buy electrodes; find out first-hand why they are so widely preferred by electric furnace operators. Write for details and prices today.

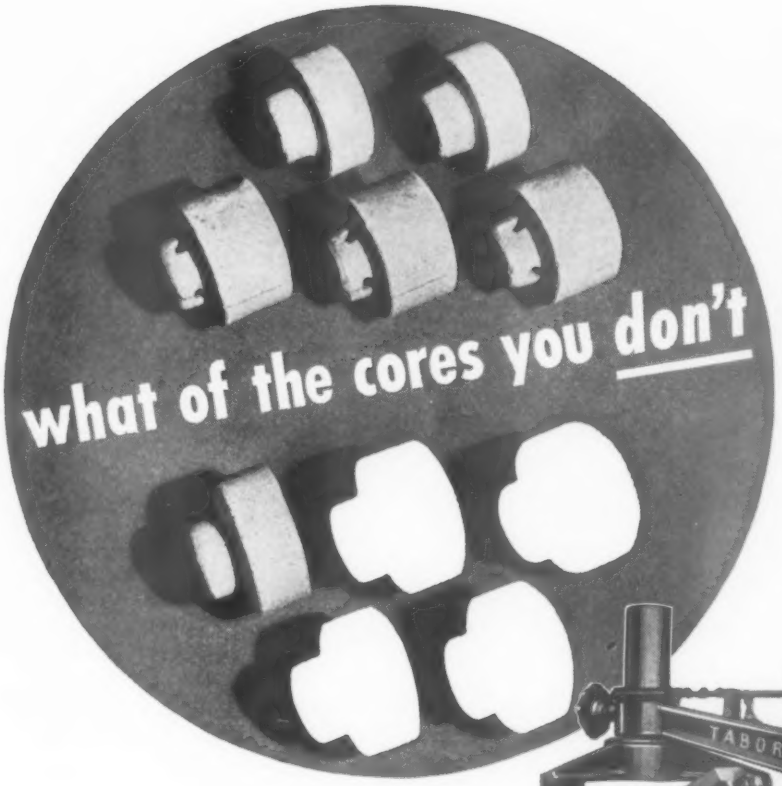
Specify INTERNATIONAL Electrodes for — Slow consumption • High current capacity • Low rate of oxidation • High thermal conductivity • High degree of purity • Consistently uniform properties and dimensions • Low cost per ton of production.

1833

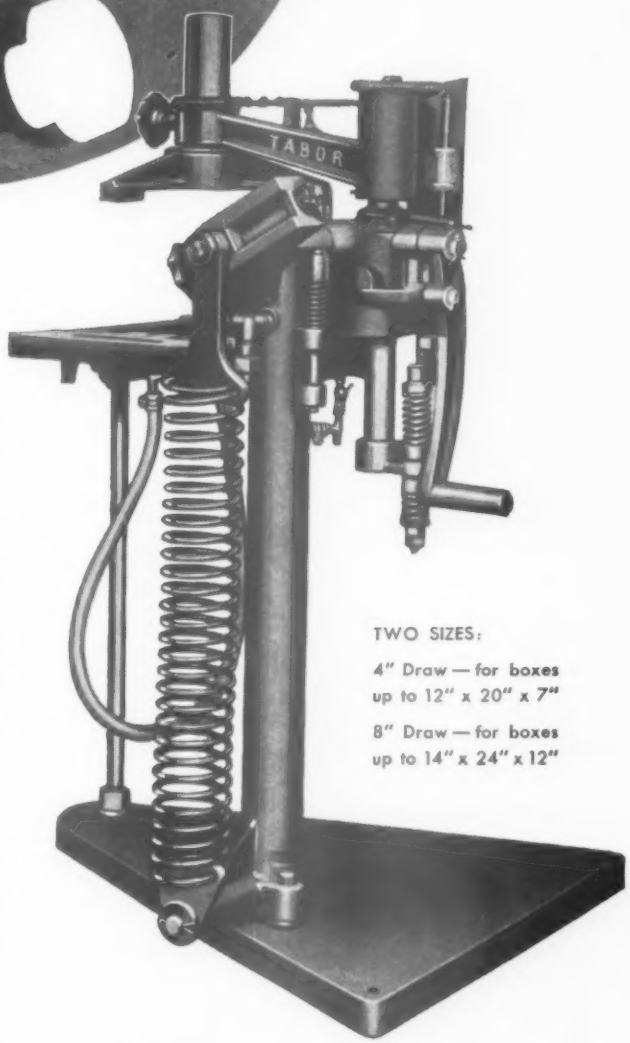
ICE

International Graphite & Electrode Corp.

SAINT MARYS, PA.



...but what of the cores you don't make?



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. . . those additional cores that a Tabor Rollover Core Machine could turn out for you in the same time.

The reason for "upped" production of small cores with the Tabor machine lies in its design—featuring simplicity, compactness, handy control.

There's no need for the operator to walk back and forth in order to clamp, level, roll over and unclamp the core box. Instead, he saves valuable time. From *one position*—and with *one control lever*—he completes each operation, from clamping the plate to conveniently swinging out the drawn core.

The ingenious features in the Rollover Core Machine are good examples of the plus-values built into all Tabor foundry equipment. That's what comes of 62 years' experience in designing and building foundry machines that more than meet foundrymen's needs.

TWO SIZES:

4" Draw — for boxes up to 12" x 20" x 7"

8" Draw — for boxes up to 14" x 24" x 12"

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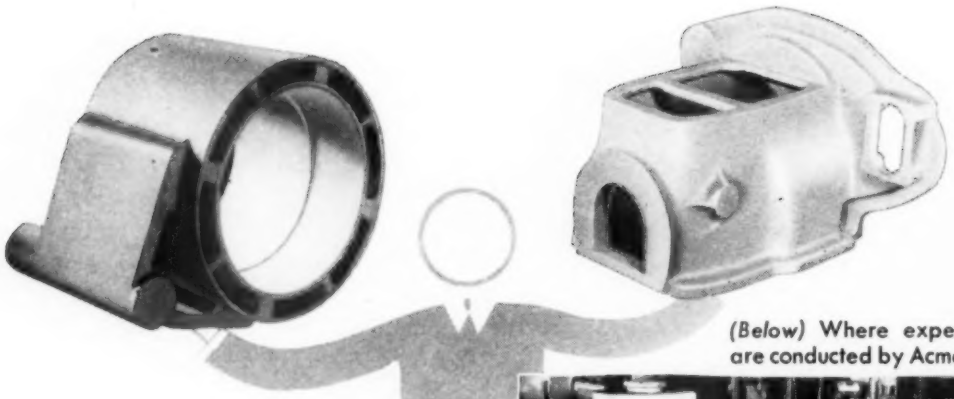

(Below) Where experiments with light metal alloys are conducted by Acme's Cooper Metallurgical Lab. Div.

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IF you doubt whether aluminum has the strength required for a particular part you need, put your problem up to Acme metallurgists. Acme Triple-A Almag 55 alloy, for instance, has the strength of malleable or cast iron, but only one-third the weight. Its tensile strength of over 50,000 psi—yield strength of over 28,000 psi—is speeding the change from heavy metals to light weight aluminum.

Don't continue to handicap your product with heavy-metal castings. Triple-A Almag 55 is but one of the new aluminum alloys developed by Acme's Cooper Metallurgical Laboratory Division. High-quality sand and permanent mold aluminum castings produced by Acme are helping many manufacturers reduce the weight and boost the salability of their product. Ask Acme what strong, light-metal castings may do for you.

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Write for new bulletin giving full technical details on Almag 55 aluminum alloy. Tell us also what your part or product must do—what strains it must meet, what impacts it must withstand, and get Acme recommendations and quotations on your castings requirements.

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Leaders of Industry Form National Castings Council

ON Nov. 8, representatives of the leading technical, management and trade associations of the foundry field met at the Waldorf-Astoria in New York and voted to form the National Castings Council. This organization in itself probably represents the greatest co-operative effort ever undertaken by the foundry industry, and should provide machinery for tremendous future progress and development in the production, sale and application of castings.

Membership in the National Castings Council now is held by the American Foundrymen's Association, Foundry Equipment Manufacturers Association, Foundry Supply Manufacturers Association, Gray Iron Founders' Society, Malleable Founders' Society, National Founders Association, Non-Ferrous Founders' Society, and the Steel Founders' Society of America.

The idea of an overall group representing all branches and all activities in the castings industry is not new. Early in the war emergency it became apparent that certain classes of foundries were unable to function with maximum efficiency in war production because those in charge of procurement at Washington were not familiar with both the product and the production problems of these foundries. As the war progressed and demands became greater and more diversified, difficulties of the foundry industry increased. Many of these have carried over into the reconversion period.

In the latter part of 1941 and early in 1942 the president of the American Foundrymen's Association led a movement to organize a co-operative overall group to handle foundry problems in connection with war production. Officers of various foundry organizations held several meetings but the leadership in the industry seemed unable to convince all factions that such a united effort was practically mandatory. The present movement which has resulted in the formation of the National Castings Council was initiated by the officers of the National Founders Association.

Founders of the National Castings Council indicate that the organization will in no way supplant the activities of any of the member organizations. It is believed the Council can act as a fact-finding body and that the results of its studies will aid in co-ordinating the efforts of all groups and thus permit each to do even a better job of serving its members. The new council will be able to speak for the foundry industry as a whole whenever occasion for such overall representation may arise.

Each of the eight member organizations will have two representatives, one of which must be its president. Present plans of this council do not include the raising of funds.

THE FOUNDRY congratulates the officers of the eight organizations who have had the vision to found the National Castings Council. May their efforts and those of the Council, result in a bigger and a better castings industry.

Frank G. Steinebach
Editor

How Much Ve

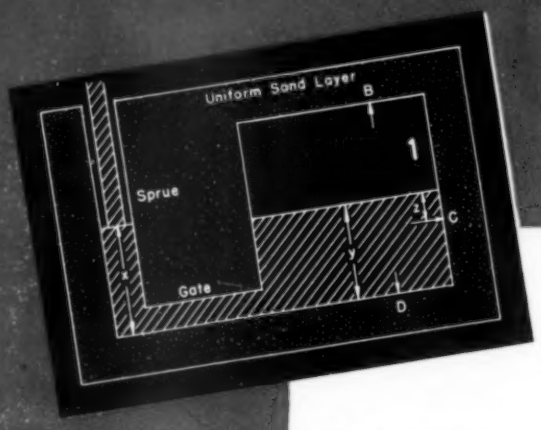


Fig. 1 — Pressures at mold face to counteract gas from sand. Metal head pressures in sprue (*x*) and in mold (*y* and *z*) are 0.3 lb per sq in. per in. Pressure at *B* is minimum in high venting power sand, equal to atmospheric pressure; maximum in low venting power sand, equal to *x* —*y*. Pressure at *C* is *z*+*B*. Pressure at *D* is *y*+*B*

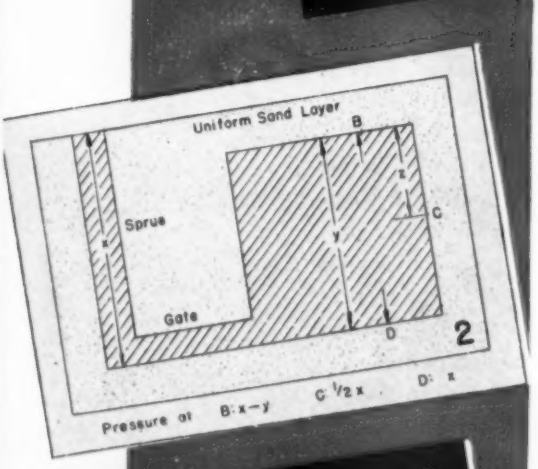
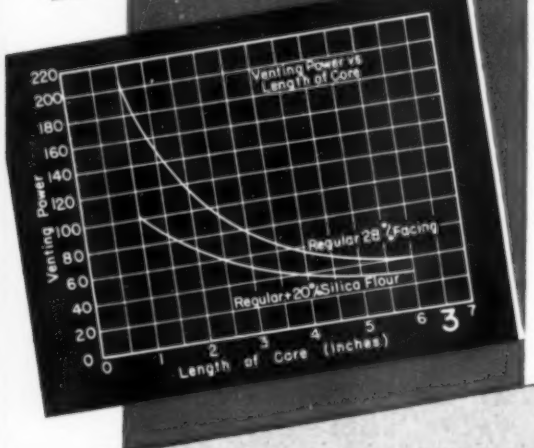
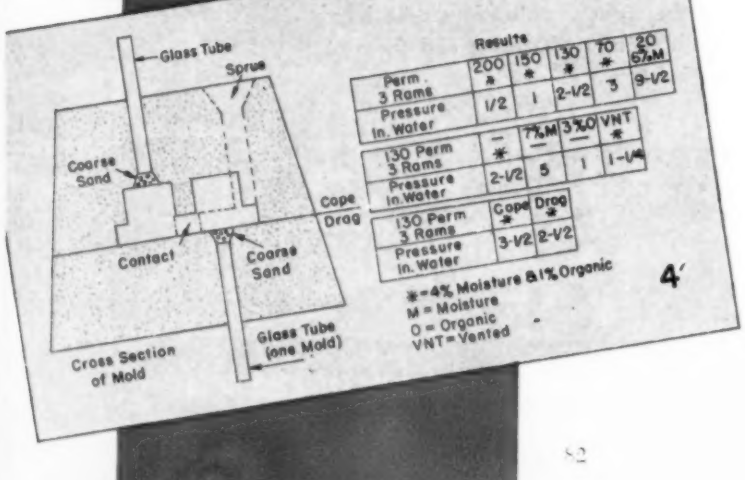


Fig. 2 — Pressures at mold face to counteract gas from sand. Pressure at *B* is *x*—*y*; at *C* is ½*x*; at *D* is *x*





THIS article is a compilation of spasmodic investigations relating to steel casting defects and green sand properties. The data and observations reported here are the results of numerous independent and apparently unrelated experiments which, when fitted together, disclose facts not compatible with some widely and strongly held opinions.

While the writer has abstracted from the many tests run, rather than report in detail, the conclusions advanced have been amply supported in commercial application at the Dodge Steel Co.

The title of this article may seem far-fetched on first thought, but the reader of the text will find that the heterogeneity and many ramifications of the subject to be discussed make difficult the selection of an appropriate but short title.

In a paper, "Mold Surface Gas Pressure," by Dietert, Doelman and Bennett (AFA *Transactions*, 1944), the authors introduced their subject by saying: "A sizable group of casting defects unquestionably are caused or enhanced by the back pressure of gas at the mold surface. In this group of casting defects, one may include blows, pinholes, penetrations, seams and rough surfaces." To this list, the average steel foundryman would add scabbing and miss-runs.

While it seems possible that all of these defects may be attributed in at least part to the extreme conditions which could result from very large mold gas pressures, yet there has been almost no conclusive experimental confirmation reported in the literature. That such strongly held opinions regarding mold gas pressures and casting defects can exist without sturdy supporting evidence is somewhat startling. One is led to believe that such opinions either are extremely difficult to demonstrate or are unwarranted.

When discussing mold gas pressures, foundrymen tend to include those formed from the vaporization of water and the decomposition of organics additively. Because the water vapor or steam is able to condense in the average mold, while gases are not, one can easily exaggerate the potential gas pressure available.

Fig. 3—Depth of sand face plotted against permeability numbers

Fig. 4—Showing method used and results obtained in determining influence of various factors in creating gas pressure in the mold

Venting Power ?

Must Green Sand Molds Possess

By E. C. TROY
Dodge Steel Co.
Philadelphia

The conditions resulting in gas production in a given mold will vary appreciably between the drag and the cope. The rate of temperature rise at the mold face will differ in various points in the mold, depending on the rate and duration of the metal flow. As the metal enters the mold cavity and flows across the bottom, there is little opportunity for preheating the drag. The side walls and the cope, on the other hand, can experience either very little or a great deal of preheating, depending on the time these surfaces are subjected to the radiant energy of the metal before they are in direct metal contact. Since the gas pressure generated in any given portion of the mold sand will be directly related to the rate of temperature rise and mold venting power, one might expect the greatest gas pressure to be generated in the drag or bottom.

Figs. 1 and 2 are sketches illustrating a simple version of what might happen, although it is unlikely the process will ever be this simple. A mold of uniform venting power is only imaginary. Note that a uniform venting power would presuppose lack of corners, vents or openings which would induce lower pressure areas. In Fig. 1, it is reasoned that the pressure of the compressed air and mold gases (B) is dependent on the height of the metal in the sprue and the venting power of the mold. If the mold had a very low venting power, the inflow of metal would reach a maximum only when the sprue was full and the pressure would be equal to the head pressure of metal in the sprue less the metal head in the mold. If the mold had a high venting power, as with a large opening in the cope, the pressure B would be only slightly above the outside atmospheric pressure. Note the lower the venting power of the sand the greater the sand gas back pressure must be to blow into the mold. This acts in part to compensate for the slower venting of gases in low permeable sands. The addition of a vent or opening in the cope lowers B and the necessary pressure to blow.

Nothing is implied by these sketches and remarks other than to point out that various possibilities exist in the same mold with the same sand. To draw conclusions from laboratory sand tests would be most difficult. It should be obvious that the mold construction plays so important a role that a knowledge of more than sand composition and permeability are essential to any conclusions.

In Fig. 3 the depth of sand face is plotted against permeability numbers. The value at 2-in. thickness corresponds to the conventional permeability number. These values were obtained in the laboratory on room-temperature sand specimens. This plot could be called venting power vs thickness of sand. The decrease in venting power between the two sands with increased thickness of sand is not proportional. The sand of a higher permeability at 2 in. decreases in venting power at a more rapid rate than the sand of lower permeability. Measurements of room-temperature permeabilities and volumes of gases produced on heating to some predetermined temperature will not necessarily give a true picture of the relative gas pressures generated from the sand in the mold. While it is true that the sand of which the mold is made contributes directly to the maximum gas pressure generated in any given mold, one is still left with a difficult evaluation.

It is desirable to have at least a rough conception of how gas pressures build up in the mold, and to have an idea of the influences of some of the more important factors, such as moisture, organics, artificial venting, and the relation of pressure in cope and drag. Fig. 4 illustrates a method used to obtain some relative values. At the beginning of pour stage 1 and during the pouring, the pressure registered was somewhat uniform and less than later stages 2 and 3. Stage 2 builds to the maximum pressure witnessed in any of the three stages. This is due to a continued rapid inflow of metal causing compression of the air with a diminishing surface area through which to vent. A sudden surge of pressure, not dependably measured on the monometer, occurs at the end of stage 2. Values reported are the third stage. The third stage is the maximum pressure witnessed after the mold is filled.

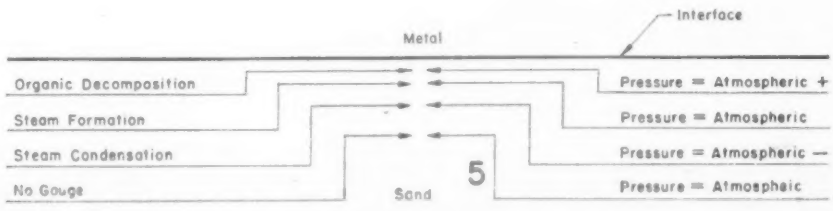


Fig. 5—Probable order of gas evolution

In interpreting these figures it should be remembered that 1 in. of metal pressure in the sprue is equal to roughly 8 in. of the water pressure reported. Or, if one will divide the reported water pressures by 8, the pressures would then represent the height of metal in the sprue or mold against which the gas could blow.

As has been mentioned, steam produced at the mold face will, on passing back into the cool sand, condense. As the steam condenses, a low pressure area at the line of condensation is produced which will help to increase the venting power by increasing the pressure difference. Fig. 5 is an attempt to illustrate this reasoning. The organic gases will not condense and therefore are dependable gas pressure raisers. Since most organics used in sand decompose at temperatures above 212 F, the probable order of gas production along a heating plane is: First, water to steam which expands back into the cool sand crowding out the air between the sand grains and cooling to a condensate; second, organic decomposition to produce steam and organic gases which expand back into the low pressure area of steam condensation, building the pressure back above atmospheric.

The steam from water and organic gases from organic decomposition will behave differently. Most of the steam will condense, and some of the organic gases will dissolve in the steam condensate. The total gas left to vent will be a relatively small part of the total gases originally produced. If one lifts apart a cope and drag section at various intervals after pouring, the line of condensation is easily noted to be but a relatively short distance behind the decomposing organic. The decomposition is noticeable in a new sand facing by the charred and darkened appearance of the sand; the area of condensation by excessive dampness.

In the initial stages of metal entry into the mold, this progressive migration by water to steam to water is probably very rapid, and the distance between the steam generation to the steam condensation zones is probably very small. As time proceeds, the width of these zones probably increases. This reasoning results from a study of temperature zones measured by thermocouples in the mold. Large gradients in temperature over narrow bands exist in the earlier measured times, while the gradients diminish into wider bands with longer times, Fig. 6 (C. W. Briggs, *The Metallurgy of Steel Castings;* C. W. Briggs and R. A. Gezelius, "Studies on Solidification and Contraction in Steel Castings, III," AFA *Transactions,* 1935).

It is difficult to see the picture in complete detail, but it is most probable that steam generated from water in the sand is important only during the initial impact of the metal against the sand, and thereafter is of far less importance as a pressure raiser than the organic matter present. When using dried oil sand cores and green sand cores interchangeably in the

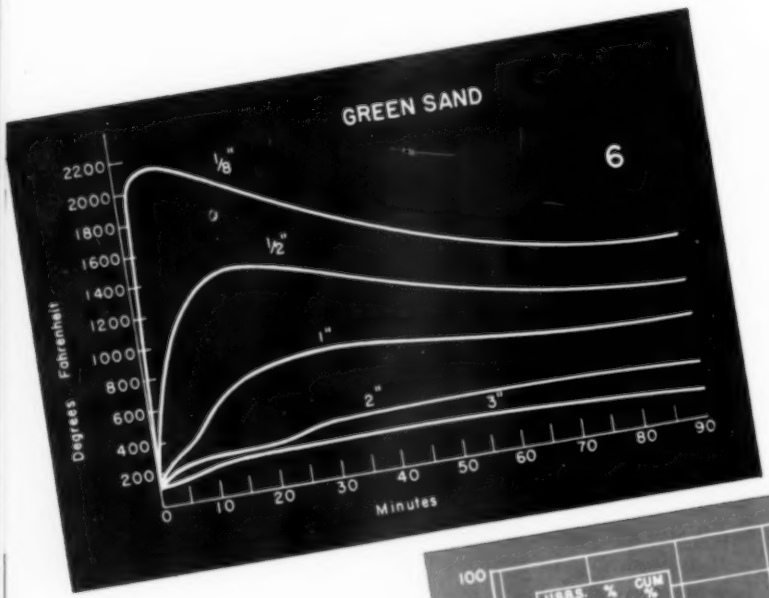
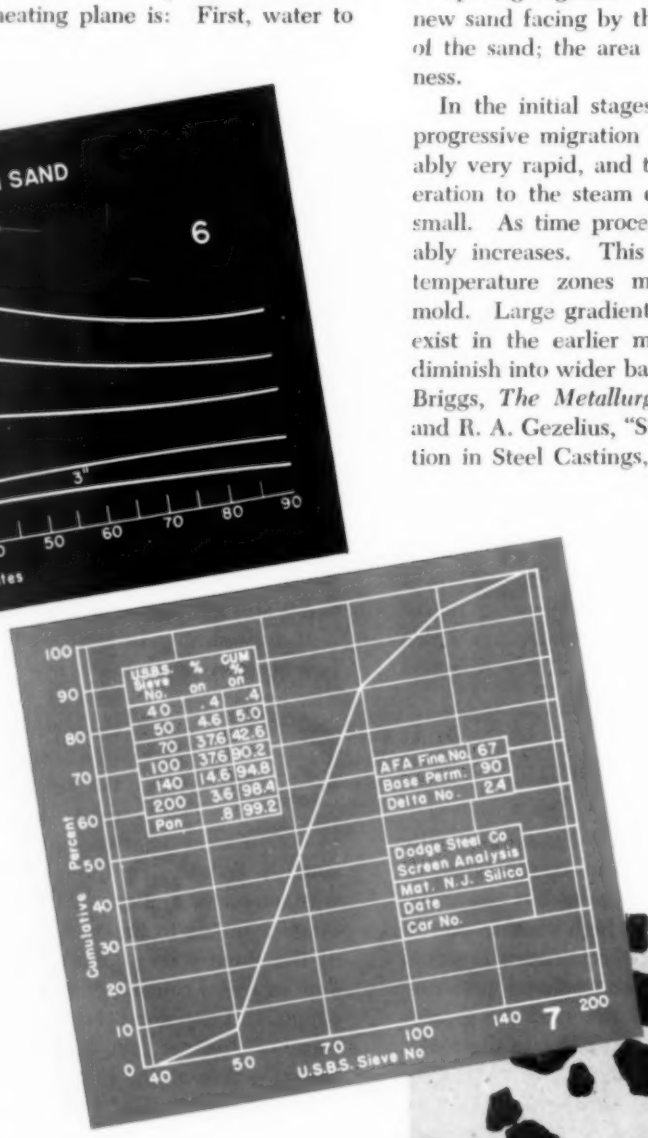


Fig. 6—Heat transfer rates of a green synthetic - bonded washed silica sand. Permeability 173. *(Briggs and Gezelius)*



Figs. 7 and 8—Screen analysis and grain shape, respectively, of sand used for cores and mold. This sand has base permeability of 80 to 100

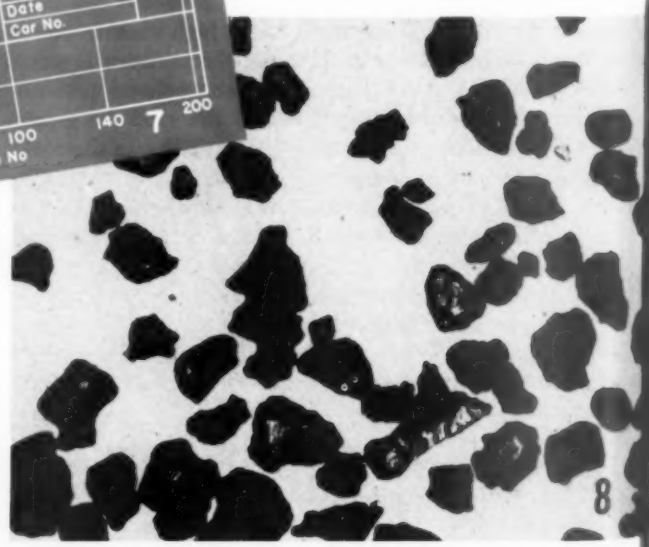


Fig. 9—Illustrating type of cope venting frequently employed to prevent misrunning and entrapped gases

Fig. 10—Radiograph showing typical cope side gas bubble

same mold, a difference in behavior is noted. Even though the green sand core may have an equivalent organic content, greater need for venting of the dried sand core is experienced. This suggests that the presence of water may be beneficial in the reduction of gas pressures. This benefit may be derived from the ability of the moisture to take large quantities of heat from the surface of the sand and from its ability to dissolve at least a part of the organic gases produced.

It is the writer's opinion that the danger from moisture in ordinary green sand practice has been overemphasized. It could be said that no harm has been done by overemphasis on the importance of moisture in green sand, but the writer believes otherwise.

Permeability Is Not the Answer

Why do steel foundrymen use coarse sands in their green mixtures which are subject to burning on and penetration? Why do they selectively vent the mold? They do so in the belief that permeability in a large quantity is essential in green sand practice because of steam. This conceived need for high permeabilities originated in the distant past and has been repeatedly emphasized by various speakers and writers on the subject. In a symposium before the AFA in 1934, George Batty carried this theme to the ultimate when he urged the venting of even the bottom boards of green sand molds to avoid pinhole formations. At one time or another almost every defect in green sand casting manufacturing has been laid to moisture content and low permeability.

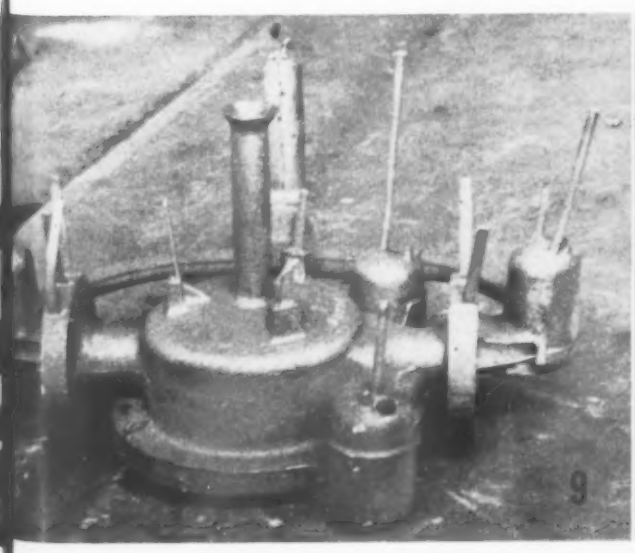
That most insidious of steel casting defects—the pinhole—has been found to be more prevalent in electric arc steel manufacturing where small green sand molds are poured. This defect, more than any other, has been responsible for the extreme attitude toward moisture and permeability values in green sand. Because the same steel poured into dry and green sand molds exhibited different degrees of porosity, it was concluded that the steam from the moisture must be the culprit.

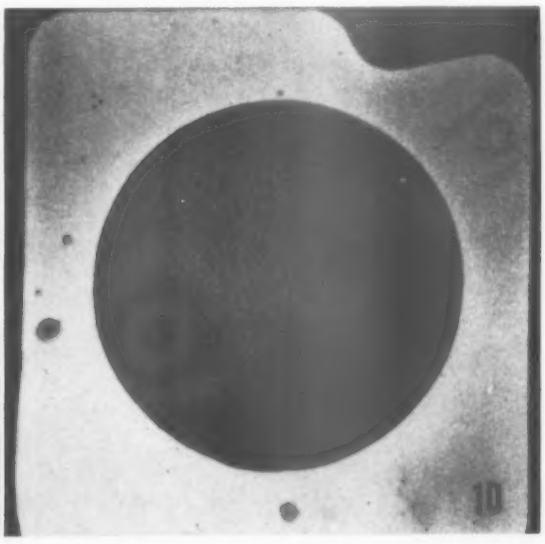
If steam was the source of the trouble, it was assumed that lower moisture or higher permeability would alleviate the difficulty. The facts that dry sand molds frequently exhibited pinholes, that raising permeability or lowering moisture does little to deter pinhole formation, that steel of high enough aluminum content cannot be made to pinhole, while steel of very low or no aluminum can rarely be counted on to do other than pinhole unless made in the open hearth, seems to have so badly confused the foundryman that he is willing to grasp and cling to the extremely weak hypothesis regarding the relation of moisture and permeability. Today he adds as much as 3 lb of aluminum per ton to his electric arc steel which, unless lost through oxidation, makes pinholing almost impossible. Yet he stubbornly adheres to his coarse sand, to which he must add silica flour or fine wash.

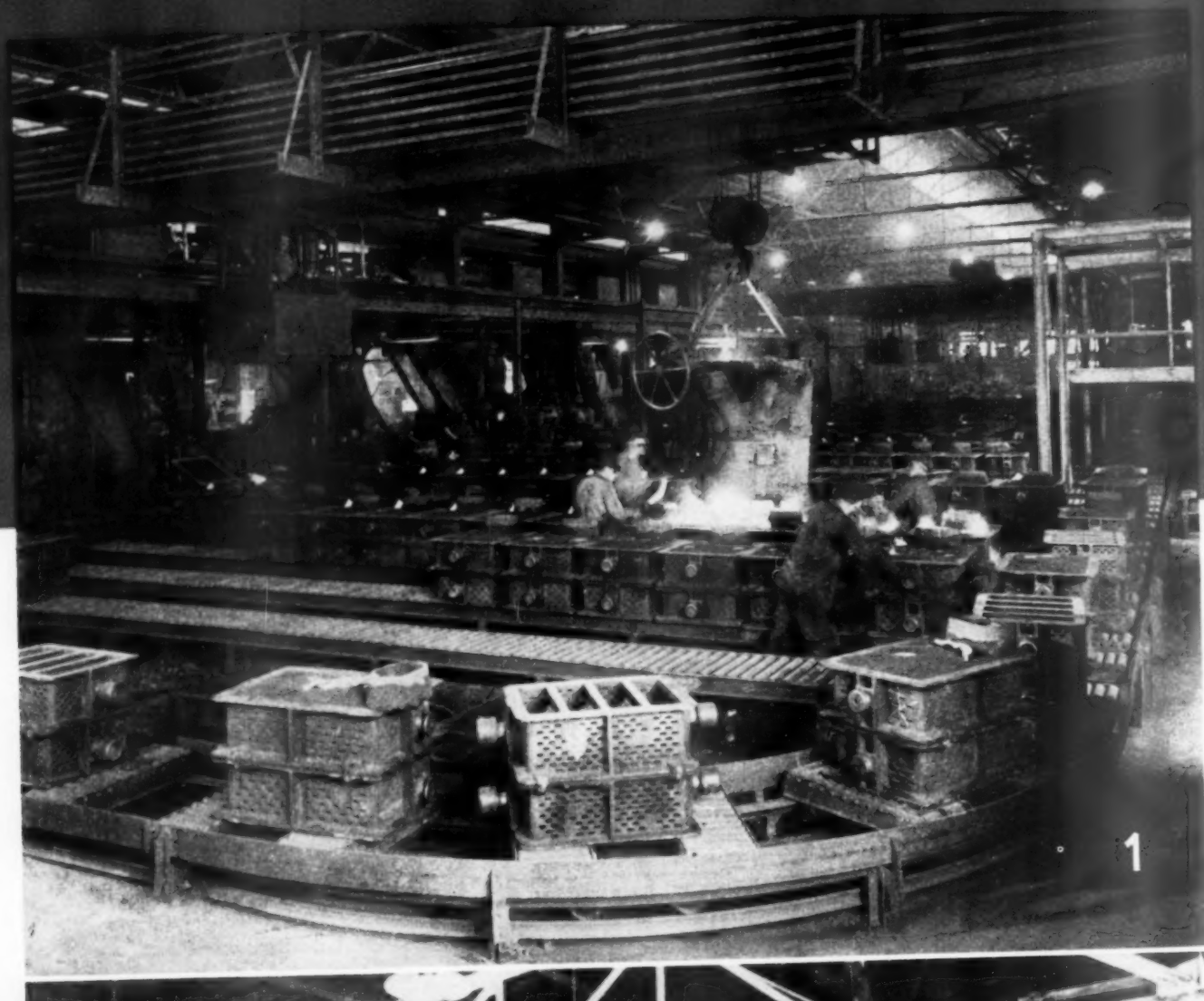
The writer has witnessed numerous tests on silicon-killed electric arc steel and has never found any confirmation of the benefits derived from higher permeability or lower moisture in the sand. To the contrary, numerous experiments have shown that a given heat of silicon-killed steel shows a lower frequency and severity of pinholing in tightly rammed fine sands than in loosely rammed coarse sands of a much higher permeability. While experiments on the influence of moisture indicate that a dried mold is less susceptible to pinholing, there is little apparent difference between a mold of 1 per cent moisture and one of 5 per cent moisture.

It seems likely that while moisture may influence the formation of pinholes, the amount of such moisture necessary is very small and, for all practical purposes, it matters little how much moisture is present over and above this bare minimum. That is, some small quantity of moisture in the sand, probably less than 0.5 per cent, is sufficient for the reaction promoting pinholes, and any moisture in excess of the bare 0.5 per cent will have little further influence.

The use of fine sands in production operations resulted in improved surface finish, but after several months of operation with green sands of 55 to 75 permeabilities and moistures of 4 to 5 per cent, it was the consensus throughout the shop that while the surface finish had improved markedly, the amount of scabbing unquestionably had increased. Because a solution to the scabbing of the 55 to 75 permeability sand was not found, the grain size and distribution were changed to give a base permeability of 80 to 100. The grain shape (*Please turn to page* 216)







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Modernizing Malleable Iron Foundries

By FRED A. PAMPEL
Chain Belt Co.
Milwaukee

FOUNDRY operators and equipment manufacturers have, in the past, considered malleable iron foundries a poor field for the application of cost reduction equipment. Except for molding machines, pouring equipment, overhead cranes and power trucks, malleable foundries generally have not taken advantage of improved methods and material handling technique. This applies particularly to the so-called jobbing foundries. Before proceeding very far, the term jobbing foundry should be clarified, as it is used rather loosely when describing types of foundries.

A rather extensive survey has shown that the so-called jobbing malleable foundry has generally been a high production foundry on the basis of the number of castings made. According to popular terminology, any foundry that makes a practice of selling its castings in the open market is considered a jobbing foundry and differs from the so-called production foundry as exemplified by the automotive, or other captive foundries. Under this classification some of the highest production foundries in the United States, such as Campbell, Wyant & Cannon Foundry Co. and Wilson Foundry & Machine Co., would be considered jobbing foundries. However, on the basis of the castings made, these foundries belong in the production foundry group.

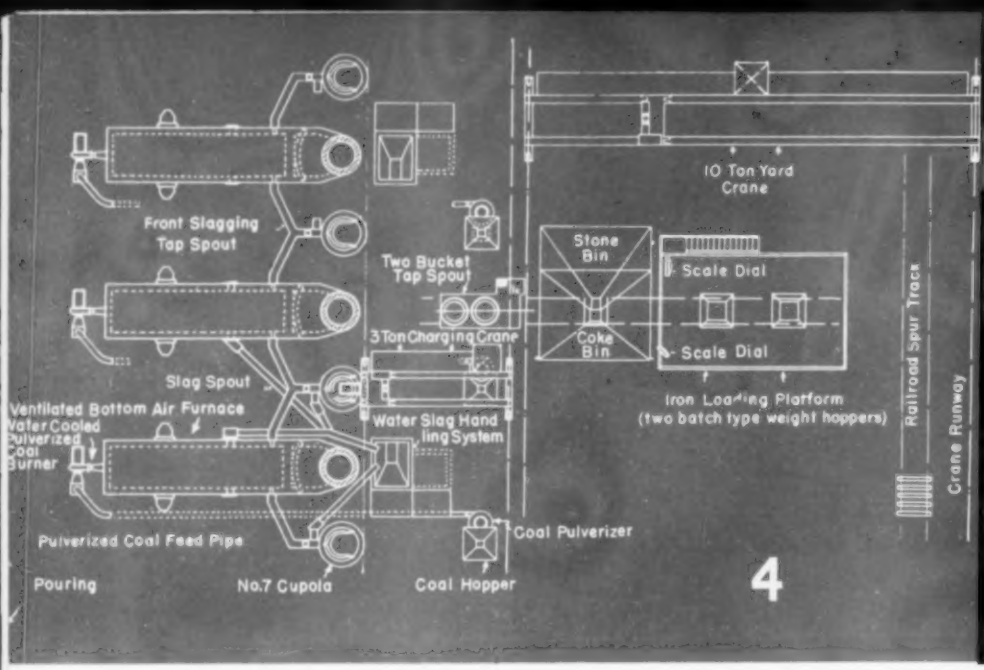
While the two foundries mentioned are gray iron, their classification would be the same as any number of malleable foundries. Under the accepted classification of foundries, such foundries as Belle City Malleable Iron Co., Racine, Wis., and the General Malleable Corp., Waukesha, Wis., would be considered jobbing foundries, but based on the number of molds produced, these foundries should be classed as production foundries. If malleable foundries generally are examined closely, it will be found that 90 per cent are in the production or semiproduction class.

To approach the problem of cost reduction by the introduction of efficient mechanical equipment in all departments, it is first necessary to examine a period of time, say five years, during which the orders would be considered a general average as to the number and type of castings that were made. If the number of orders and the type of castings to be made average up to a point where they can be kept going for a full day's run on any one pattern, this would qualify the foundry to be on the semi or production basis. In fact, in modern foundry practice it is possible to make two or three pattern changes a day without jeopardizing the final results as far as production or cost reduction is concerned. Management and sales can be of assistance by selective selling so as to keep the castings and flasks within a standardized range.

To produce an efficient plan for the flow and handling of materials through the foundry proper, it is necessary to examine all departments, particularly the melting department when applied to a malleable foundry. Until recently the belief that malleable iron foundries were the most difficult type of foundry to mechanize was due primarily to the long melting cycles and the necessity of pouring off a complete melt in a short period of time. In recent years as the malleable industry started to utilize duplexing melting process, this attitude toward mechanization has changed, since the duplexing system results in practically continuous pouring which has very definite advantages even in a jobbing foundry.

A great deal of thought should be given to this problem as total tons melted also has a large bearing as to whether duplexing would be economical. Synchronizing the other operations with this new operation of continuous pouring eliminates the necessity of disrupting operations throughout the shop, such as calling all the available labor from the foundry and cleaning room to pour off a heat two or three times a day. This method of operation has always been a sore point and a major production loss, because practically everybody that had to take part in the pouring required a rest period of ten to twenty minutes before they

Figs. 1, 2 and 3—Illustrating the different methods of mold handling. Combination of mold conveyor and gravity roll conveyors is shown in Fig. 1, the straight gravity roll conveyor in Fig. 2, and the straight mold conveyor in Fig. 3



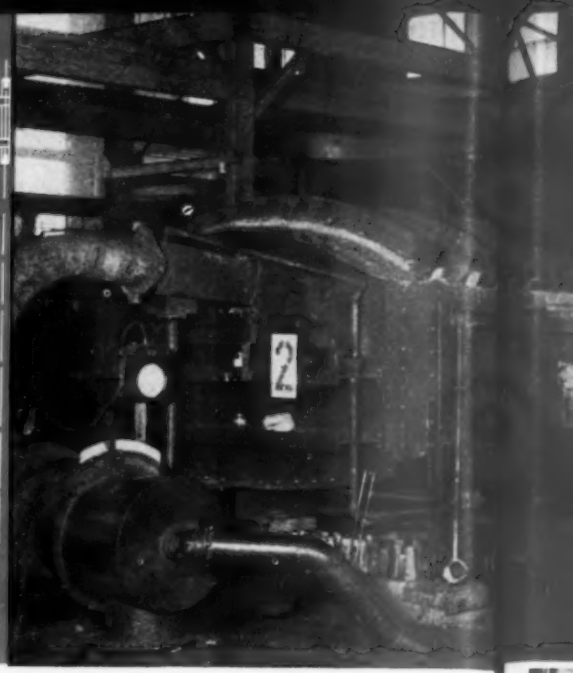


Fig. 4—General arrangement of material yard and melting units for duplexing system of melting in malleable iron foundry

Fig. 5—Ventilated bottom air furnace (12½ tons per hour) delivering metal to cylindrical ladle

Fig. 6—Malleable duplexing unit of 10 ton per hour capacity. Gases are consumed by waste heat boiler in background. (Illustrations courtesy Whiting Corp., Harvey, Ill.)

could go back and resume their normal operations.

Training a pouring crew to pour more or less continuously during the day relieves the other operators from this fatiguing task with its resultant loss of time. It also makes for smoother operation throughout the entire foundry, as the the men are not required to break into the sequence of their work and more or less get out of the rhythm of operation.

Whether a shop is considered a production, semiproduction, or jobbing foundry, there isn't a whole lot to be done in the line of mechanizing until it is definitely decided what the type of melting and method of pouring will be, as every succeeding operation will be based on these fundamental operations.

After a decision has been reached on the type of melting unit, the question of mechanizing the foundry can then be approached. To do this properly it is necessary to divide the operations into their respective groups, namely handling material in yards, mold handling, sand handling, sand conditioning and casting handling.

Select Material Handling Plan

Handling of raw materials has two divisions—first, handling materials from the cars to the storage areas; second, from the storage area to the point of use. In some cases the double handling can be eliminated by locating the storage area at the point of use, conditions permitting.

Handling of pig iron, scrap and other ferrous material can be disregarded as generally the overhead crane with a magnet is employed for this work. This method is the most economical as the crane can be gainfully employed on other work in the material yard, thereby cutting overhead costs chargeable to the unloading operation.

Several methods are used for unloading new and core sands, including by a grab bucket or by means of conveying equipment where the tonnage handled is large enough to warrant the initial expense. Under some conditions a combination of the two has proved economical. This also applies to the handling of fluxing materials and coke.

Handling melting components from the storage yard to the melting unit has been greatly improved in the last decade and it has become accepted practice to employ the use of skip hoists, wishbone or crane type chargers loading directly into the melting units. Accuracy is controlled by the use of scale cars, weigh hoppers, or some medium of this type incorporating the use of scales. All this equipment has been standardized so that it becomes a relatively simple task to pick out the proper method to meet any conditions.

Four types of equipment usually are available for mold handling: Gravity roll conveyors, a combination of gravity roll and power conveyors, power conveyors, and overhead cranes. The type of mold handling equipment selected for any particular system is dependent upon a number of factors, such as method of pouring, size of molds handled, method of molding, production requirements, and the number and quantity of different alloys being poured. Cooling time is also a big factor in making a selection.

The gravity roll type of conveyor is often selected for the average jobbing or semiproduction foundry due to its greater flexibility of application over power conveyors. Some of its advantages are that the size of the molds can be changed oftener without upsetting the pouring schedule, and that the molds can be segregated so that if there is any special metal or unusual pouring temperature or procedure it can be done without interfering with production. Careful study, however, should be made so that subsequent operations are not penalized.

The combination of gravity roll and power conveyors usually is employed where it is necessary to build up a bank of molds either for intermittent pouring or for the length of cooling required. After the molds are poured on the gravity rolls and allowed the necessary cooling, the power conveyor is then used to transport them to a central shakeout point. The power conveyor used for this transporting must be designed to meet the conditions

prevalent in the particular foundry where it is to be installed—experience has shown that this combination has some very definite advantages over either the straight gravity roll system or the power conveyor in a jobbing foundry, as it can be made to combine the best features of each.

The power conveyor method, in which the mold is set directly on the conveyor and is poured while on the conveyor, is best adapted to standardized work where the cooling time and pouring procedure stay within a specified range so as to prevent complications from shaking out too soon or from poor pouring. It is also dependent on the length of runs and the number of pattern changes involved in a day, as it is not practical to put on a great number of jobs where the pattern change time would interfere with operating the power conveyor at its greatest efficiency. Here again the arrangement of the conveyor selected would depend on a number of local conditions, all of which must be analyzed.

The other method which will be mentioned briefly is the handling of molds by crane, monorail, or jib hoist. With this method molds are carried out from the molding equipment by means of cranes, monorails, or jib hoists and are set out on the floor to be poured. They are then transported by the same means to a control shakeout where sand and castings are removed and flasks are returned to the molders. This method is not very efficient and should be used only where the progressive method of handling is outlawed either by the size of the mold, the length of cooling time, or the number of molds to be made.

Regarding the sand handling unit, the type and arrangement of system to be used is not a great factor, as most systems can be arranged, within reasonable limits, to meet any conditions required by pouring, molding or the building arrangements. Neither does the question of whether the foundry is a jobbing, semiproduction or production foundry enter into the arrangement or the type of sand handling system selected. The basic units would be the same in any case.

The sand handling system (*Please turn to page* 226)

Gra

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

PROBLEMS relating to manpower, merchandising and other subjects which affect the industry's outlook over the long term received major consideration in the program of the Gray Iron Founders' Society's 18th annual convention held at the Netherland Plaza Hotel, Cincinnati, Oct. 22-23. The meeting had a record attendance of approximately 300.

New officers chosen by the board of directors for 1946-47 at the conclusion of the convention include: President, Howard A. Stockwell, treasurer, Barbour Stockwell Co., Cambridge, Mass.; vice president, Ronald E. Kucher, president, Olympic Foundry Co., Seattle; secretary, E. E. Smith, vice president, American Brake Shoe Co., New York; treasurer, Homer Britton, vice president, Cleveland Foundry Co., Cleveland.

New directors elected for three years are: C. B. Shanley, Semi-Steel Casting Co., St. Louis; C. B. Magrath, Greenlee Foundry Co., Chicago; R. G. Schaefer, Schaefer-Goodnow Foundries Inc., Pittsburgh; G. E. Tisdale, Zenith Foundry Co., West Allis, Wis.; J. B. Heisler, A. C. Williams Co., Ravenna, O., and John McIntyre, Sibley Machine & Foundry Co., South Bend, Ind. Hermann P. Good, Textile Machine Works, Reading, Pa., was elected a director for one year, and Mr. Kucher, the new vice president, was elected a director at large.

Nine members of the society were honored at one of the luncheon meetings by the presentation of scrolls in recognition of their distinguished service to the gray iron foundry industry. Recipients were: Walter L. Seelbach, president, Superior Foundry Inc., Cleveland; C. R. Culling, president, Carondelet Foundry Co., St. Louis; A. E. Hageboeck, president, Frank Foundries Corp., Moline, Illinois; Ronald E. Kucher, president, Olympic Foundry Co., Seattle; R. D. Phelps, president, Francis & Nygren Foundry Co., Chicago; J. H. Pohlman, president, Pohlman Foundry Co. Inc., Buffalo; P. E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O.; H. S.

Convention speakers, shown in left panel, top to bottom, included: Senator Wayne L. Morse of Oregon, Lester B. Knight, John M. Price, Hermann P. Good, Edward C. Hoenicke, Frank O'Malley and H. L. Edinger

Left—Officers and directors of the Gray Iron Founders' Society at the recent Cincinnati convention. Top row, left to right: C. T. Milles, George Tisdale, C. B. Magrath, R. G. Schaefer, J. B. Heisler, H. P. Good, E. C. Hoenicke, John McIntyre, C. B. Shanley and C. R. McGrail. Bottom row: Max Kuniansky, G. H. Alten, R. E. Kucher (vice president), H. A. Stockwell (president), E. B. Smith (secretary) and Homer Britton (treasurer)

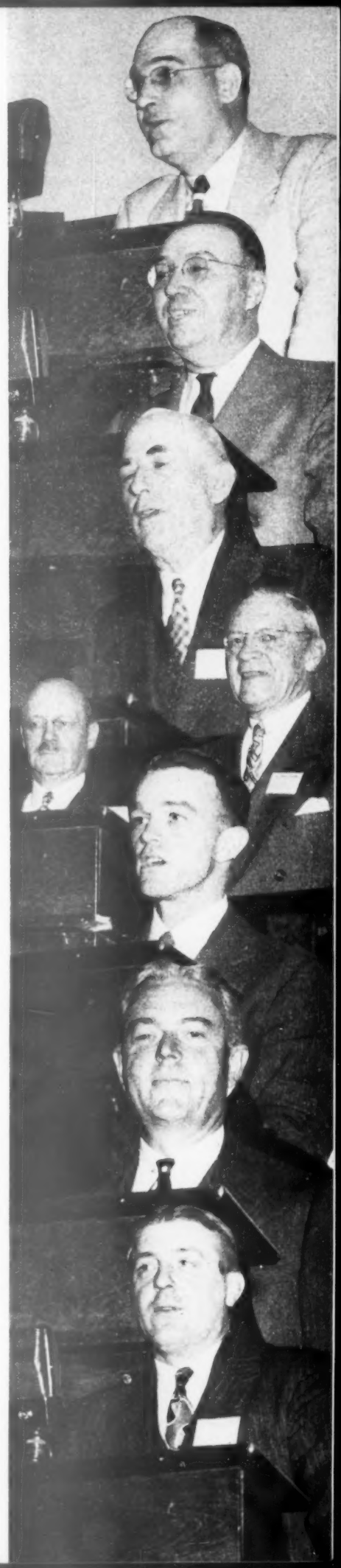
...ron Founders hold 18th Annual Meeting

Washburn, president, Plainville Casting Co., Plainville, Conn. and W. J. Grede, president, Grede Foundries Inc., Milwaukee.

A plea for true collective bargaining, rather than the political bargaining which has prevailed so frequently in settling labor disputes, was made by Senator Wayne L. Morse of Oregon in addressing a second luncheon session. He said there is too great a tendency on the part of business to run to government for settlement of such disputes; government, he believes, should stay out of the field of wages, hours and conditions of employment. Senator Morse urged that collective bargaining be made to work, as one step in removing government domination of business, and warned against the hysterical type of labor legislation which merely entrenches government as the dictator of conditions affecting labor. Mayor James G. Stewart of Cincinnati preceded Senator Morse at this session with an address of welcome.

H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J., and retiring president of the society, in reporting on the past year's activities expressed what is probably typical of the industry's expectation that at least one to two years of continued active business is in prospect. He also voiced the hope that government price control over gray iron castings may be removed by early 1947. Mr. Edinger, as well as other speakers, outlined the progress made by the society in establishing efficient cost control methods in individual foundries, and it was predicted that the industry will be on a sounder cost basis than ever before when the more intense competitive situation expected to follow the present sellers' market arrives. Fourteen individual cost groups established in various parts of the country now are accessible to a large majority of the industry for consultation and assistance on cost control work.

The first technical session was devoted to manpower problems and included discussion of such subjects as the development of management (*Please turn to page* 154)



Right panel, top to bottom, shows other speakers as follows: D. J. Vail, Dr. Frank August, Edward P. McHugh, A. E. Hageboeck, John L. Carter, J. Schaum, Carl W. Bonbright and Dr. Joseph S. Kopas

Fluidity

The author reviews published work and offers recommendations on fluidity testing practice, a method used to evaluate casting characteristics of foundry alloys. This paper was presented before the Institute of British Foundrymen as the official 1946 exchange paper from the American Foundrymen's Association

By K. L. CLARK
Naval Research Laboratory
Washington

TWO reasons for fluidity testing are: 1. Fluidity of new or unfamiliar alloys may be determined so that the person responsible for casting operations can choose the one with the best fluidity among several alloys which otherwise may be equally suitable for the specific application. Some evidence (105) indicates that many alloys have approximately equal fluidity when they are heated an equal degree above their respective liquidus temperatures. This point has not been proved conclusively, however, and more data are necessary for the information of foundrymen. There is a definite need for fluidity testing in the laboratory to aid the development of better foundry practice.

2. Fluidity testing on the shop floor is a means of quality control to which some foundries have not given careful consideration. Some foundrymen believe that fluidity testing is strictly a laboratory expedient and that it has no place in a production shop. Certainly, in foundries where no castings having thin sections or intricate shapes are poured, or where misrun castings are never encountered, it would be a waste of time to train personnel for reliable fluidity testing. Likewise, in certain nonferrous foundries where temperature measurement is not difficult, fluidity testing assumes minor importance. However in shops where metal is used at temperatures above 2200 F for pouring castings which are susceptible to misruns, it is believed that routine fluidity testing can be employed with profit.

In support of this statement, it may be said that a fluid-

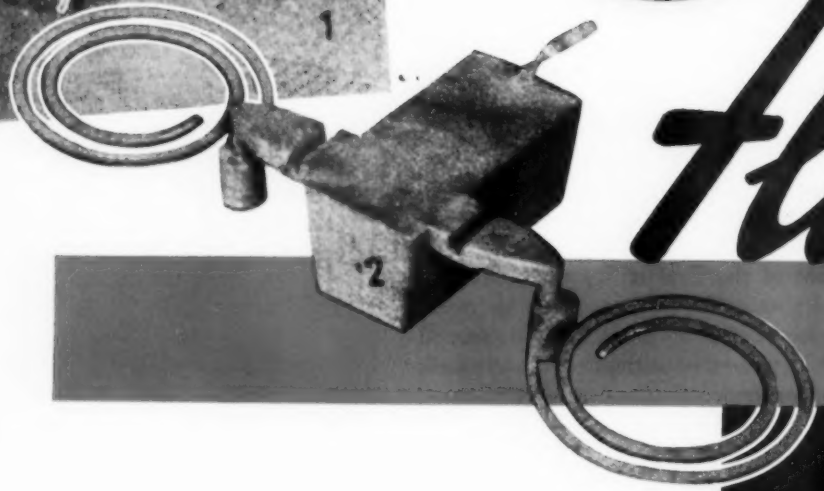


Fig. 1—Mold and thermocouple assembly prepared for pouring (Mott, Schaefer and Cook)

Fig. 2—Cast pair of spirals (Mott, Schaefer and Cook)

Fig. 3—Pattern for large fluidity test piece. A—Spaced properly for ramming in drag. B—Individual parts separated by glass plate

Fig. 4—Chart showing that mold temperature has small influence on fluidity values of aluminum alloys (Courty)

ity test has been used with marked success to prevent the occurrence of misrun steel castings in the foundry of the U. S. Naval Research Laboratory. After a period of observation, it was learned that if the length of the fluidity spiral poured with metal taken from the direct arc furnace is less than 20 in., intricate castings are apt to be misrun; that if the length is more than 26 in., misruns do not occur, and that if the length is 20 to 26 in., misruns occur occasionally. These observations apply to normal operation in the pouring of miscellaneous shop castings at NRL, and the limiting values would be different in another foundry where ladle preheating, ladle capacity, pouring time and other conditions would also be different.

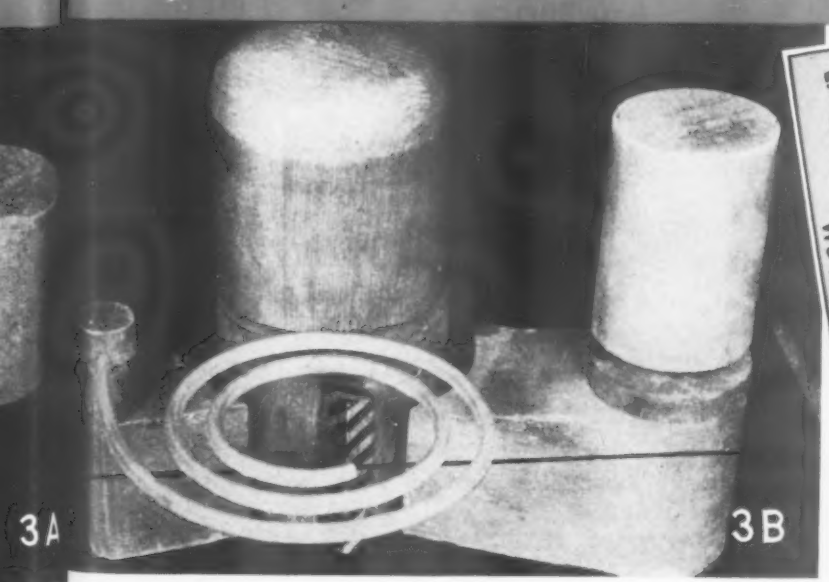
Fluidity is the term used in this paper to express the ability of metal to flow. It is the resultant effect of several physical conditions which govern the solidification of molten metal as it flows in a mold. Fluidity is not a true physical property of the metal and is difficult to define exactly. A foundryman can express it most easily by means of a comparison. For example, metal is said to have adequate fluidity for a specific casting application if it flows freely through the gates and fills the mold completely so that a casting is formed without misruns or cold shuts.

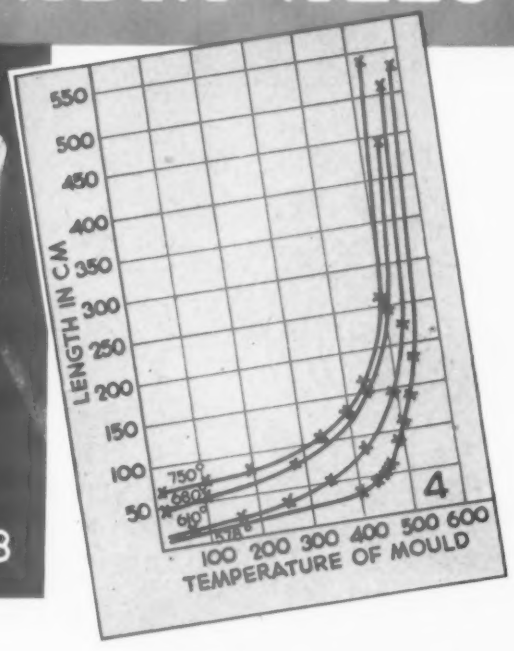
Many troublesome variables would have to be considered if an attempt were made to evaluate fluidity on a truly physical basis, as heat transfer, fluid flow, viscosity, mechanics of solidification, film formation, surface tension, gas evolution, and suspended nonmetallic materials are operative in determining this complex quantity. Accordingly, the only convenient method of evaluating fluidity is an empirical one. That is, carefully standardized test conditions must be established and rigorously reproduced from test to test. Even when this is done, the values obtained are only relative and can be used only by observed correlation with casting practice for control purposes or for comparison of one metal with another on an arbitrary basis.

Many investigators have studied fluidity and have reported their findings in the literature of foundry technology. Figs. 5 through 9 illustrate some of the test pieces which have been used. A comprehensive bibliography 1-60 on fluidity of metals, covering the period from 1902 to 1935, was prepared by the British Iron and Steel Institute. The preponderance of attention in recent years has been given to ferrous alloys and the work of British investigators has been particularly noteworthy. These reports [66, 67, 75, 76, 77, 78] and other valuable contributions on fluidity [61-65, 68-74, 79-105] since 1935 are also listed in the bibliography at the end of this paper.

Thus, most of the factors concerning the condition of the metal and their effects upon fluidity have been considered at one time or another. Unfortunately, many of the investigators have adopted totally new test pieces or have so altered previously used test pieces that it is not possible to compare data. Progress usually comes from changes and alterations, and these changes have served a useful purpose. However, it appears desirable to agree upon a standard test piece and testing procedure so that foundrymen can speak a common language of fluidity and can compare notes on the fluidity of their alloys. Adoption of such a standard throughout the foundry industry is the objective of the Committee on Fluidity Testing of the American Foundrymen's Association. It is not meant to imply that one test piece and one testing procedure are necessarily best for all foundry alloys, but it is believed

Testing OF FOUNDRY ALLOYS





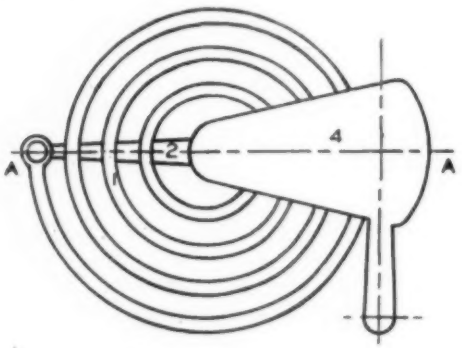
Fluidity Testing

that some concessions, made in the interest of standardization, would be beneficial to the interests of all. Therefore, this paper is written to present a survey and critical appraisal of published information concerning the variables of fluidity testing.

In the discussion of these variables, consideration is given to sensitivity and reproducibility for laboratory tests and to simplicity for shop practice. Emphasis is placed on the requirements of fluidity tests for high melting point alloys but special requirements for certain of the lower melting point alloys are not overlooked.

Ideal Conditions for Testing—In practically all of the tests which have been used to evaluate fluidity of molten metals, the same basic method has been followed. Metal is caused to flow into a channel of relatively small cross-sectional areas for a distance determined by the rate at which the mold extracts enough heat to cause solidification of the metal and to stop movement of the stream. The length of flow is taken as the measure of fluidity. As with any test, sensitivity and reproducibility are necessary if the test is to be useful.

For a fair degree of sensitivity, the test piece must be designed with a definite relationship among the factors acting to drive the metal through the flow-channel, the dimensions of the flow-channel, and the thermal characteristics of the mold material. Regardless of the fluidity of the metal, if the proper relationship is not obtained, the metal



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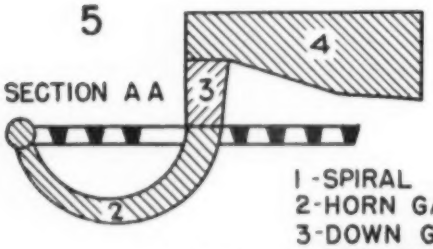
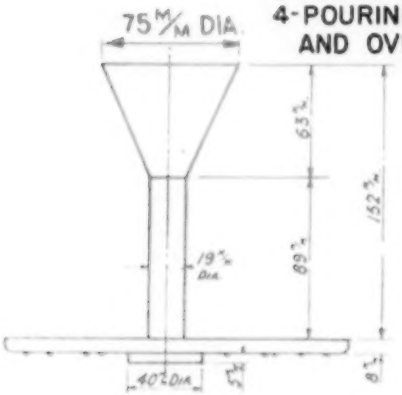


1 - SPIRAL
2 - HORN GATE
3 - DOWN GATE
4 - POURING BASIN AND OVER FLOW



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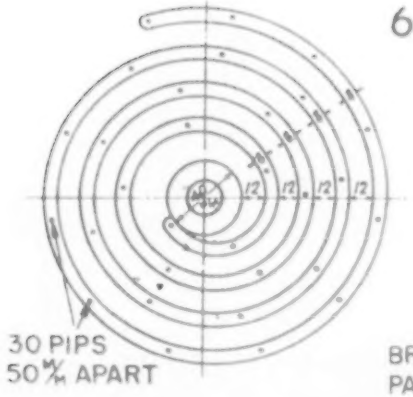
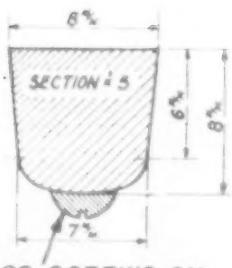
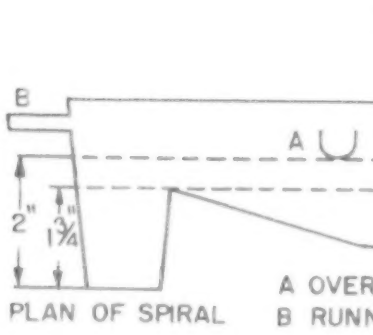


COMPLETE SPIRAL 1500mm LONG



BRASS SCREWS ON PATTERN 50mm APART

ENLARGEMENT OF SECTION



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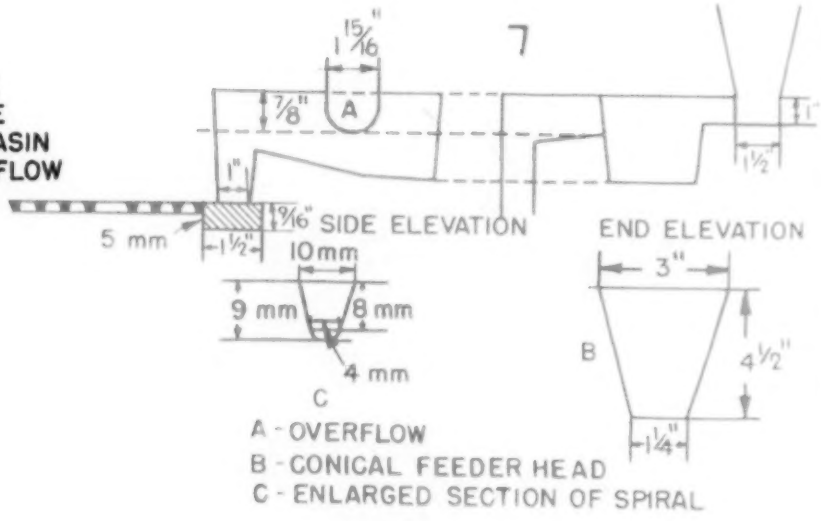


Figs. 5 through 9—Some of the test pieces used by various investigators of metal fluidity. Fig. 5—Horn-gated test piece (Saeger, Krynitsky). Fig. 6—Spiral for fluidity test (Greaves). Fig. 7—Fluidity test piece used by Andrew, Percival and Bottomley. Fig. 8—Spoon test for determination of the running capacity of liquid metal (Ruff). Fig 9—Fluidity spiral test piece (Taylor, Rominski and Briggs)

in one instance may be forced through the full length of the channel or, in another, may be frozen without having flowed an appreciable distance. In either extreme case the test is meaningless.

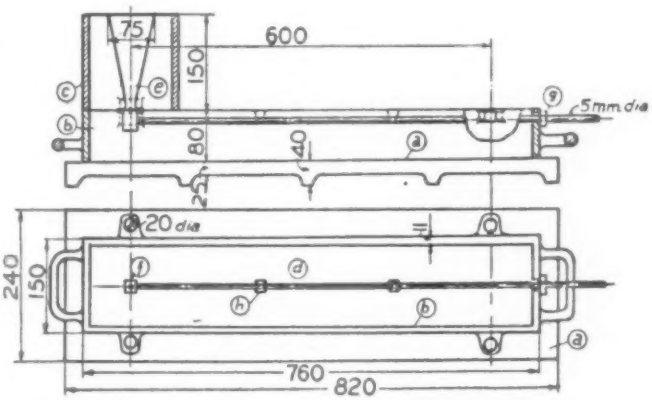
If the fluidity test piece is designed for adequate sensitivity, duplication of test conditions within close limits from test to test is still a major problem. Ideally, the conditions for optimum reproducibility are as follows: (1) the force exerted upon the metal at the point of entry to the flow-channel should be constant; (2) no other variable force such as that of gravity, due to variations in pouring rate or metal head, or of expanding gases should be imposed upon the metal during its period of flow; and (3) the conditions of heat transfer must remain constant from test to test. In practice these ideals are difficult to attain and some compromises must be made.

Channel Shape and Dimensions—In one of the earliest investigations on fluidity, West[1] used a casting in the form of an elongated wedge. This type of test casting is still used in some foundries. Most of the reported data were obtained, however, by the employment of flow-channels with uniform shapes and dimensions throughout their lengths. Square, rectangular, circular, half-circular and trapezoidal sections have been used.

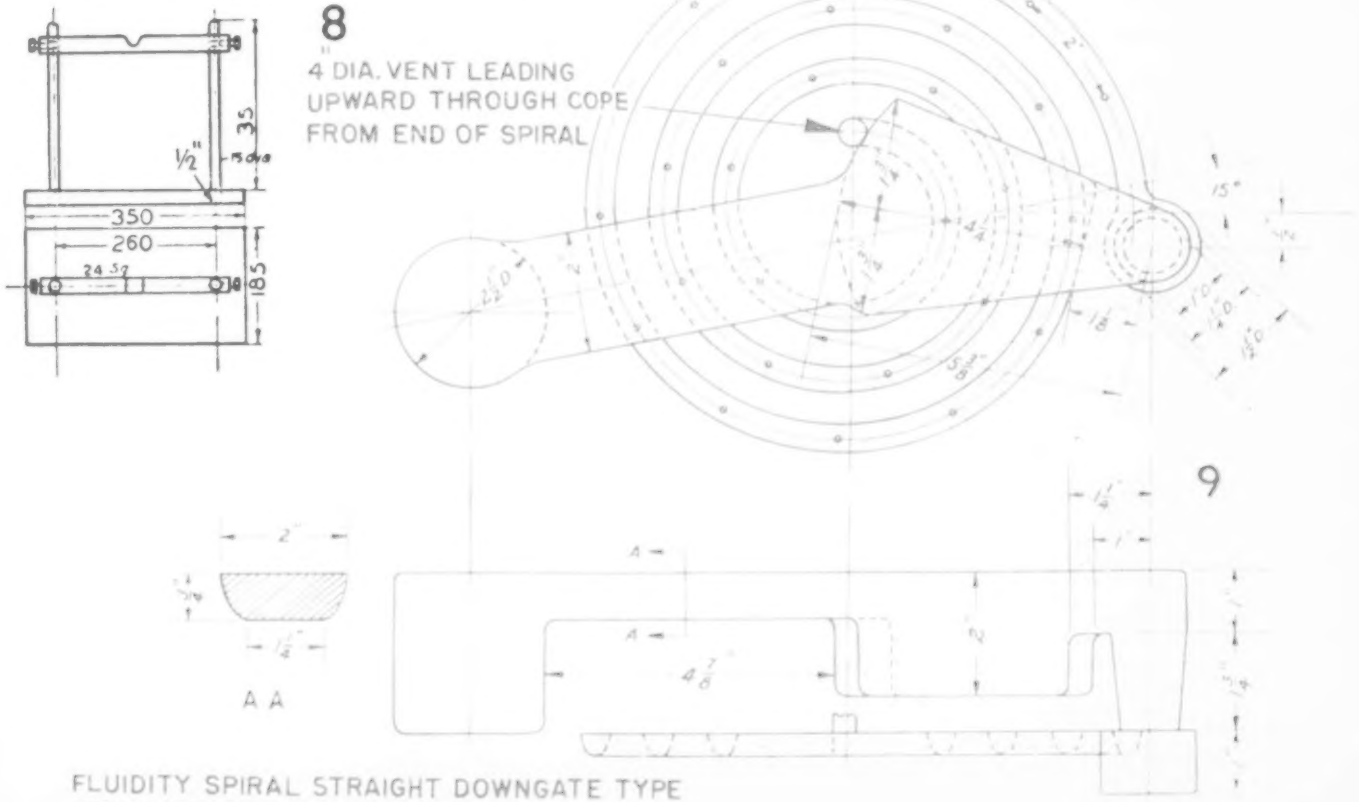
Value of Test Is Relative

Since the practical value of a fluidity test is mainly relative, it appears that the cross-sectional shape makes little difference except for the ease with which the pattern is molded. From this standpoint, a circular section is not satisfactory. Unless a straight rod is used, a circular section must be molded with a parting line and the danger of mismatches is always present. Because the complete impression of the flow channel can be made in one-half of the mold and because of the ease with which the pattern may be drawn from the sand, a half-round or trapezoidal section is believed to be most practical for the flow-channel.

Cross-sectional dimensions of the flow-channel can be varied within certain limits in accordance with the height of the down gate and the thermal characteristics of the molding material. Saeger and Krynitsky[28] used a rounded, trapezoidal flow-channel with an area approximately 1/12 sq in. The approximate cross-sectional area of the flow-channel used by Andrew, Percival and Bottomley[67] is 1/11 sq in. Ruff's[65] channel is circular and has a cross-sectional area of approximately 1/30 sq in. Taylor, Rominski,



A-PATTERN PLATE
B-DRAG
C-COPE
D-PATTERN ROD
E-POURING FUNNEL
F-CONNECTING PART
G-GUIDE BUSH
H-ROD SUPPORT



FLUIDITY SPIRAL STRAIGHT DOWNGATE TYPE WITH MODIFIED POURING BASIN

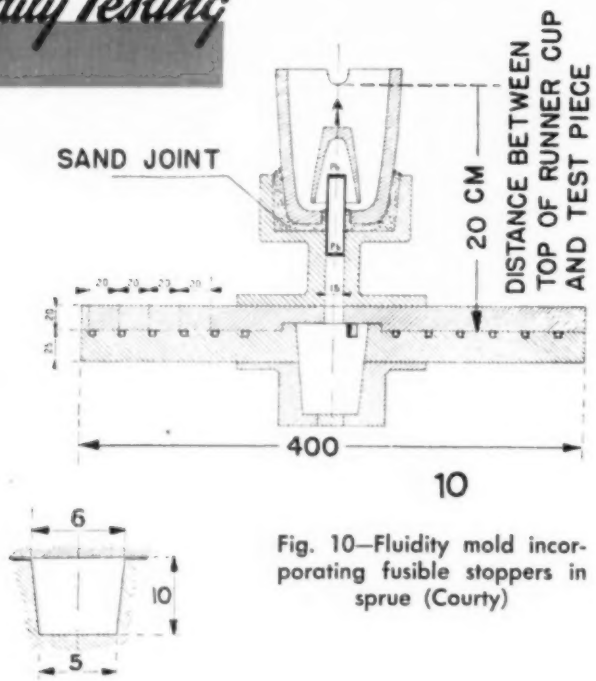


Fig. 10—Fluidity mold incorporating fusible stoppers in sprue (Courty)

and Briggs[89] made their tests with a flow-channel having a rounded, trapezoidal shape and an area of approximately 1/7 sq in. Greaves[66] also used a rounded, trapezoidal flow-channel with a cross-sectional area of approximately 1/9 sq in. Although these investigators made their studies upon ferrous alloys in sand molds, it has been reported to the writer that satisfactory fluidity tests of aluminum and copper-base alloys also have been made with the test-piece used by Taylor, Rominski and Briggs.

Ruff[65] did not use the fluidity test proposed by Saeger and Krynitsky because he believed that the flow-channel was too large to avoid turbulent flow of the metal. Whether or not turbulent flow is deleterious to the test is debatable. However, in view of the apparently satisfactory results of several investigators who used the larger flow channels, it is believed desirable to establish the cross-sectional area of a standard fluidity test channel between 1/12 and 1/7 sq in.

The length of the flow-channel must be such that solidification of the most fluid metal to be tested occurs before the stream reaches the full length of the cavity. This, in turn, is determined by the cross-sectional area of the flow-channel and by the thermal nature of the mold material and the pressure head exerted upon the metal.

Favors 60-in. Length

Of the test pieces mentioned in connection with the discussion of the cross-sectional area of flow-channel, those used by Saeger and Krynitsky[28], by Greaves[66], and by Taylor, Rominski and Briggs[89] are all approximately 60 in. long. That used by Ruff[65] is approximately 24 in. long. If the recommendations regarding cross-sectional area are to be followed, it would appear necessary to establish a length of flow-channel of approximately 60 in.

Spiral Flow vs Straight Flow—In most of the fluidity test pieces a spiral configuration of the flow-channel has been adopted for reasons of simplicity in molding. Ruff[65] used a straight flow-channel but the length is relatively short, 24 in., compared with approximately 60 in. for the other test pieces mentioned.

If the test piece is to be (*Please turn to page 244*)

TABLE 1—Spiral Tests of Steel and Malleable Cast Irons for Different Gates (Ruff)

Method of Gating:	A		B		C		D		E	
Material.	Steel.	Malleable Cast Iron.	Steel.	Malleable Cast Iron.	Steel.	Malleable Cast Iron.	Steel.	Malleable Cast Iron.	Steel.	Malleable Cast Iron.
Number of experiments.	10	6	8	6	8	6	37	13	5	6
Deviation of values, %.	25	5	6	3	7	7	3	2	3	6
Maximum spiral length. Mm.	275	1091	780	1435	615	1480	940	flowed to end	745	flowed to end
Running quality ratio of steel to malleable cast iron (max.).	1 : 4·0		1 : 1·8		1 : 2·4		1 : 1·6		1 : 2·1	
Mean spiral length. Mm.	147	933	647	1261	548	1230	753	1365	616	1314
Running quality ratio of steel to malleable cast iron (mean).	1 : 6·3		1 : 1·9		1 : 2·2		1 : 1·8		1 : 2·1	

NATIONAL FOUNDERS ASSOCIATION

holds first postwar convention

I. R. WAGNER
Newly elected president

By BEN K. PRICE
New York Editor
THE FOUNDRY

MANAGEMENT-LABOR problems dominated discussions throughout the 49th annual convention of the National Founders Association at the Waldorf Astoria, New York, Nov. 7-8. At the same time, broad economic aspects of industry and business came in for important attention, with considerable interest evident in the prospect of legislative changes in the light of the recent Congressional election. The meeting marked the first postwar convention of the association.

I. R. Wagner, president, Electric Steel Castings Co., Indianapolis, was elected president, succeeding Herman Menck, vice president, Harnischfeger Corp., Milwaukee. Franklin Farrel III, vice president, Farrel-Birmingham Co. Inc., Ansonia, Conn., was elected vice president.

The guaranteed annual wage issue will loom large over coming months, O. C. Cool, director, Labor Relations Institute, New York, told the convention at one session. The next Congress, he said, will be faced with pressure for legislation whereby employers can be financed through lean sales periods by government loans upon adoption of a guaranteed wage plan. Should such legislation be passed, management will be confronted with serious problems, he pointed out, since if an employer is unable to adopt an annual wage plan because of inability to finance the accumulation of a large inventory, government loans will be pressed upon him.

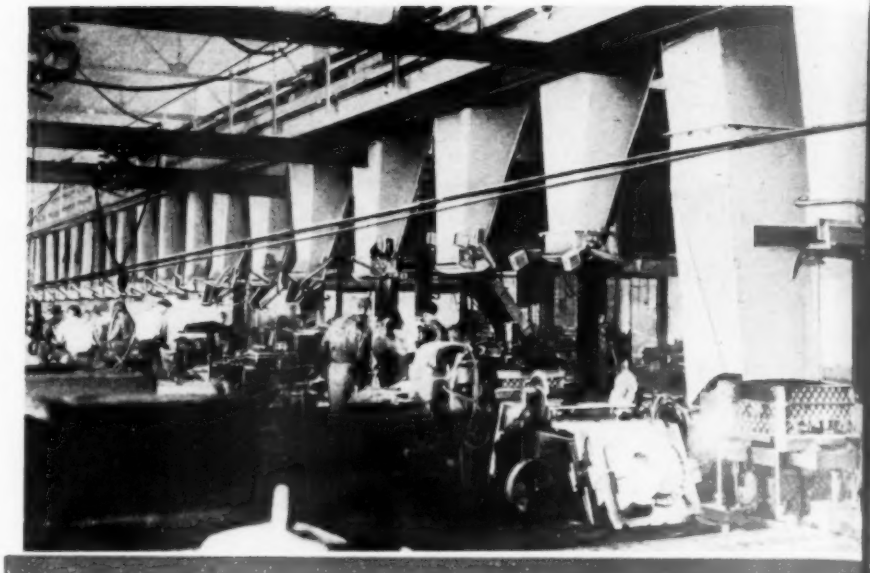
Mr. Cool added that labor leaders are gravely concerned over recent political developments and will probably avoid prolonged strikes. "They are afraid not only of serious losses in membership from long strikes, but of the possibility of restrictive legislation from a new Congress." The speaker stated, however, that because of important increases in living costs, employers should be prepared to offer some kind of a compromise on the "second wave" of wage increase demands now in prospect. He also expressed belief there is greater recognition among labor leaders of the necessity of higher production, but said that factors determining production per man-hour remain to be worked out to the mutual satisfaction of management and labor.

The problem of foreman unionization transcends all others in the management-labor category, Gerard D. Reilly, retiring member, National Labor Relations Board, Washington, declared. Subjecting foremen to the discipline of labor organization will ultimately mean that labor unions will become virtually independent contractors of industrial production.

Asserting that the problem of unionization of foremen is one of economic policy rather than of interpretation of statute, he said that in his opinion recent decisions have provided a plain "invitation to all labor organizations to annex the foremen in mass production industry, when they have always been regarded as the direct representatives of the employer." He cited the Jones & Laughlin Co., vs. United Mine Workers recent decision as an example.

Mr. Reilly proposed seven recommendations for improving existing management-labor relations: (1) Confine the labor board to judicial functions and free members of the board from certain administrative duties; (2) make sure that orders of the board are respected by labor organizations as well as by employers; (3) provide for relief against unions which refuse to process or to transport goods made by nonapproved employer; (4) provide for improved review of illegal strikes; (5) provide for improvement of handling jurisdictional strikes; (6) broaden the right of petition to the board to include employers as well as unions; and (7) increase recognition of the employers' right of free speech, except where threats of economic reprisals occur. (*Please turn to page* 237)

Cupola melts above rated capacity

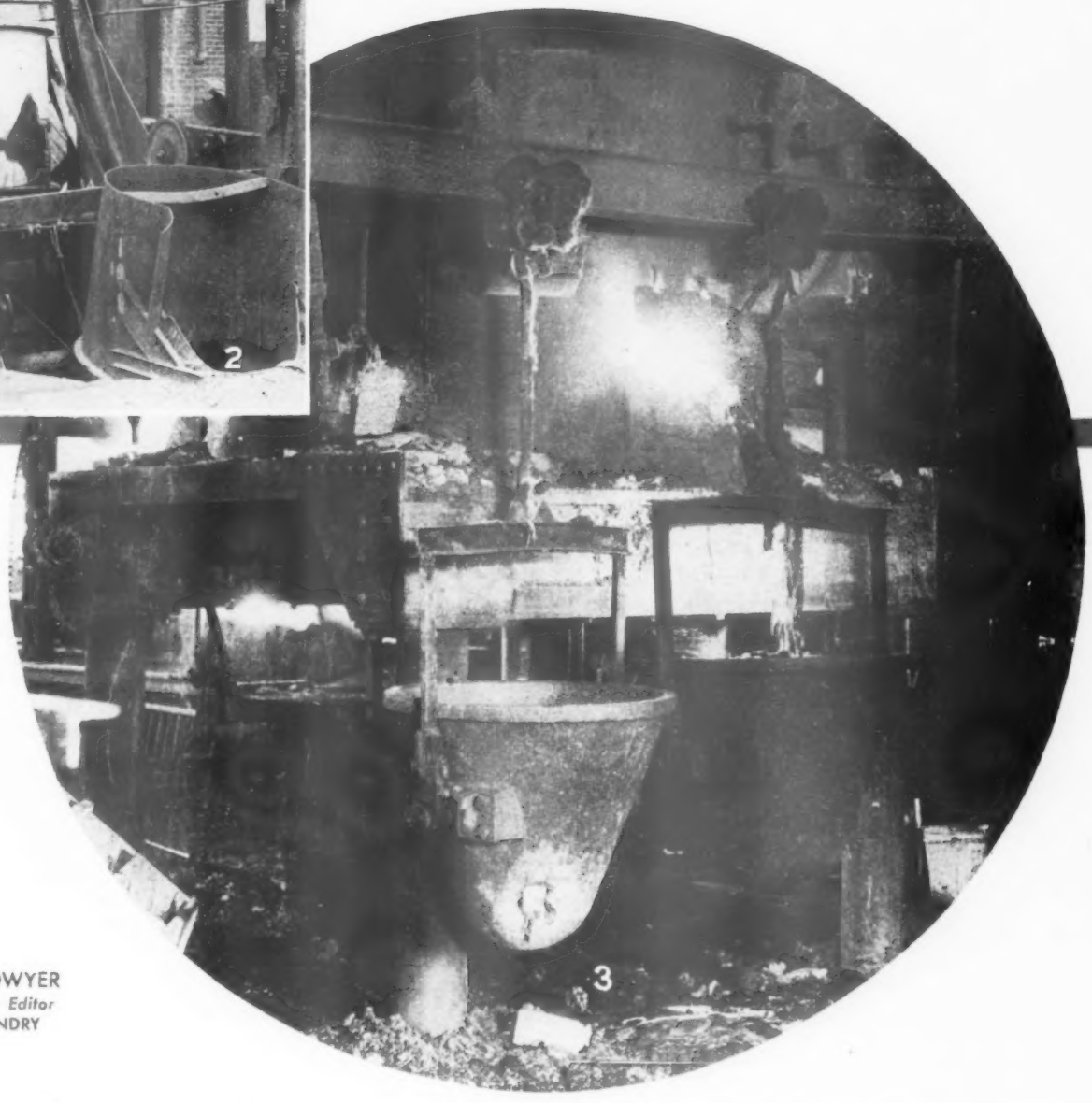


UNDER ordinary conditions the output or melting speed of a cupola is reckoned at 10 lb per hour per square inch of area at the melting zone. Under extraordinary conditions this figure may be varied to a considerable extent. One of the most remarkable examples is presented at *B* plant of the Forest City Foundries Co., Cleveland, equipped with two cupolas, one lined to an inside diameter of 48 in., constricted to 42 in. over the tuyeres, and the other to an inside diameter of 54 in., above and 48 in. at the tuyeres. Recently the smaller cupola was replaced by a larger unit 54 in. diameter inside the lining, or equal to the former larger unit.

The daily heat ranges from 90 to 100 tons, melted in the regular 8-hour day. The blast goes on at 7:30 a.m. and the bottom is dropped at 5 p.m. The blast is off for half an hour, 11:30 to 12 noon, during the lunch period. Each cupola is operated on alternate days and, extraordinary as it may appear, the melting speed of the smaller cupola equalled that of the larger unit. Even after seeing an actual demonstration, the performance challenges belief. One is reminded of the honest yeoman, a tiller of the soil, who visited a circus for the first time and saw a giraffe. Despite the evidence of his own two eyes he boldly declared to one and all, "There ain't no such animal!"

According to the published statements of recognized cupola experts, the melting speed of a 54-in. diameter cupola is approximately 11 tons per hour. Melting speed of a 42-in. inside diameter cupola is 7 tons per hour. Pushing the speed of the first up to 12 tons per hour is something worthy of comment, but still within the range of possibility. Claim of increasing the melting speed of a cupola 42-in. inside diameter from 7 to 12 tons per hour, will cause old time foundrymen to slowly close one eye, wag the old bush in mild reproof and quote the late Baron Munchausen, "Vos you dare Shawley?"

Both cupolas were charged in the same manner, alternate layers of 2000 lb pig iron and scrap and 300 lb coke. The same amount of air was blown into each cupola, the larger at a pressure of 18 oz. and the smaller at a pressure of 30 oz. However, the service was too severe for motor and blower, also on the cupola lining in the smaller cupola. On many occasions the brick lining at the melting



By PAT DWYER
Engineering Editor
THE FOUNDRY

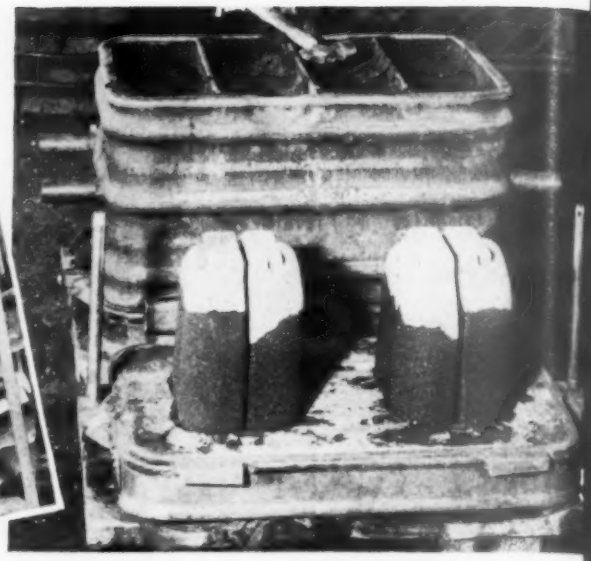
zone burned through to such an extent that it became necessary to spray the shell in the affected area with water. Finally, as stated previously, the smaller cupola was dismantled and removed and replaced by a larger unit 54-in inside diameter and every way comparable to the existing larger unit.

Installation of a new and large cupola was part of a general mechanization program which includes gravity roller conveyors in one section of the foundry, sand preparation and distributing systems and a long slat conveyor below the floor level at one end of the mold conveyor section. Red hot castings are dumped onto this conveyor and discharged at the end, where the gates are knocked off and the castings are loaded into steel boxes loaded on skids. A lift truck carries the loaded boxes out into the yard. After the castings have cooled they are delivered to the cleaning room, equipped with a full complement of tumbling barrels, pressure blast devices and chipping and grinding stands. From this area

Fig. 1—An overhead belt from the sand mixing station keeps the hoppers filled above the battery of molding machines in one section of the foundry (Photo courtesy Link-Belt Co.)

Fig. 2—The charging bucket is filled at the lower end of a skip hoist

Fig. 3—Slag from the cupola falls into cast iron pots suspended from a monorail



the castings pass on to the inspection and testing department, and finally to the weighing and shipping department.

Cupolas are charged mechanically by a steel bucket suspended from a slanting steel framework extending from the charging door to a pit below the yard level. At the upper or charging floor end the bucket may be diverted to discharge its contents into either of the two cupolas. An electrical control system terminating in an upright panel at yard level and equipped with signal lights and push-buttons, enables the operator to time the movement of the bucket up or down, and to keep the cupola filled to the charging door. An ingenious device on the charging floor indicates the necessity of retarding or accelerating the charging speed.

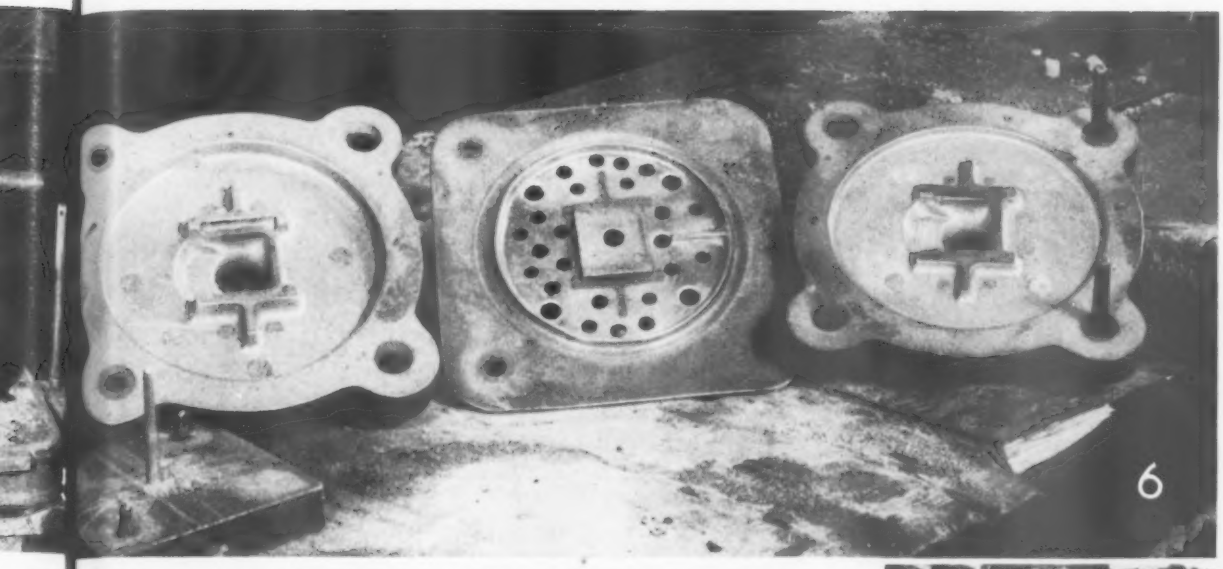
Gates, sprue and scrap from one day's heat are incorporated in the charge for the following day. The remainder of the charge is made up of pig iron and foreign scrap in various proportions, depending on the requirements of the castings into which the metal is to be converted. A typical charge may contain 35 per cent pig iron, 25 per cent domestic scrap, 25 per cent foreign scrap and 15 per cent steel scrap. The comparatively large amount of domestic scrap is due to the fact that the castings are in the light weight classification, ranging from 1 to 50 lb., a classification in which the sprue and gates may approach, in some cases equal and in extreme cases exceed, the weight of the castings to which they are attached.

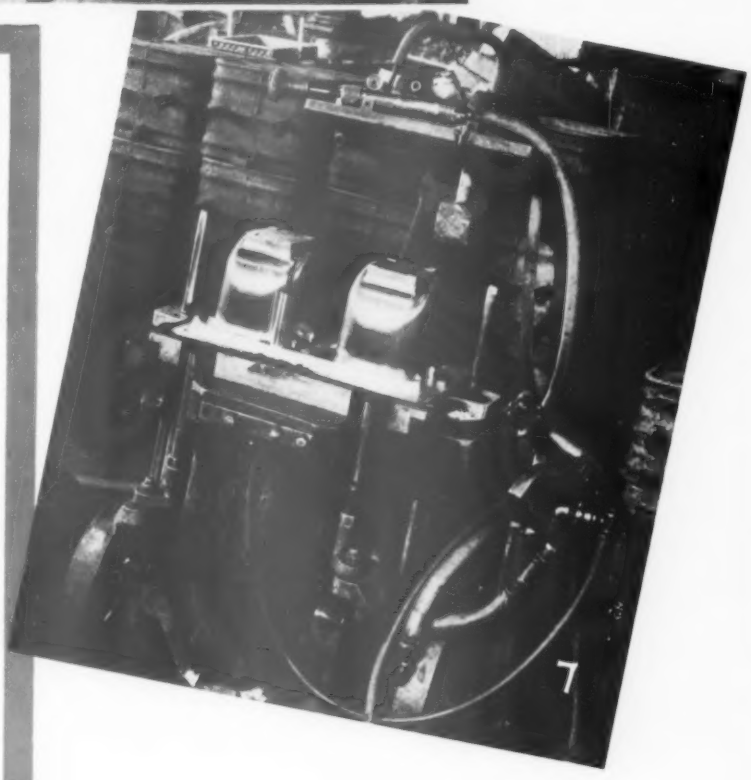
Iron charges are made up by hand on a fleet of steel boxes, either mounted on wheels, or on skids transported from place to place by lift truck. Movement of all the materials is facilitated by an extensive concrete pavement. In succession, the loads pass over a scale and come to rest temporarily close to the charging bucket pit. The load is transferred to the bucket by hand and then the buggy is pushed or carried back to the source of supply. Coke is brought in a barrow designed to hold a complete charge and dumped into the bucket. Three shovels of limestone are added from a convenient pile and then the operator pushes a button and sends the loaded bucket on its way upward to the charging opening in the cupola.

The bottom of the bucket is suspended by a hinge from the front and is held in closed position by a latch at the back. The latch extends upward as a pivoted lever. When the bucket enters the cupola the lever is tripped by coming in contact with a projection in the cupola lining. The door swings open and the contents of the bucket fall into the cupola. At the end of the return journey the swinging door is brought up to a horizontal position and the latch is adjusted to hold it in place. For a 100-ton heat this means 100 round trips for the bucket in 8 hours, or to put it another way about 12 round trips per hour, or one every 5 minutes.

A steel sheet erected about 8 ft back of each cupola catches the stream of sparks blowing from the slag hole. Slag flowing from the slag hole falls into a succession of small cast iron conical pots suspended from a monorail, as shown in Fig. 3. As each pot is filled it is moved forward to make room for the next in line. The monorail extends into the yard where the pots are inverted and the contents dumped on the ground. Average slag from a 100-ton heat amounts to 8000 lb. Swivels on the pots are located slightly above the center of gravity to hold them in an upright position, loaded or empty. This method of removing the slag keeps the floor area back of the cupolas clean and orderly, in keeping with a general program of good housekeeping and neatness which prevails throughout the establishment.

Iron is tapped regularly at the front of the cupola into a succession of 1000-lb capacity ladles suspended from a monorail system with branches extending to all sections of the foundry where molds are prepared. In several sections of the foundry molds from the machines are laid down in rows on the floor. In one section equipped with a battery of 18 molding machines set up in a straight line,





the molds are placed on gravity roller conveyors extending from the machines to the shakeout area. Each conveyor unit will hold a definite number of molds, the product of a machine for an hour or two. Through a carefully worked out program of metal distribution the molds are poured before the capacity is reached.

At the outer end of the conveyor line the molds are dumped over a grating. Flasks, bands and bottom boards are placed on a second unit of the conveyor and returned to the molding station. Sand falls through the grating on to a belt which carries it to the sand preparation station where it is mulled, aerated and cooled, and where the composition and moisture content are adjusted to meet standard requirements. Another belt carries the prepared sand over a row of hoppers which serve the molding machines, one hopper to each machine.

Red hot castings are loaded on a slat conveyor paralleling the gangway and passing by the ends of all the roller conveyors in this section of the foundry. This feature was referred to previously.

The good housekeeping program extends into the yard where new sand of various grades is kept in concrete bins and from where it is trucked into the foundry as required in the coremaking department and on the molding floors. Pig iron is neatly piled according to composition. Flasks not in use are stacked in orderly rows, with concrete walkways between the stacks and leading to a wide gangway on which the flasks are carried into the foundry as desired. Idle aluminum flasks and jackets are stored under cover in a shed at the outside south end of the foundry, adjacent to the pattern shop.

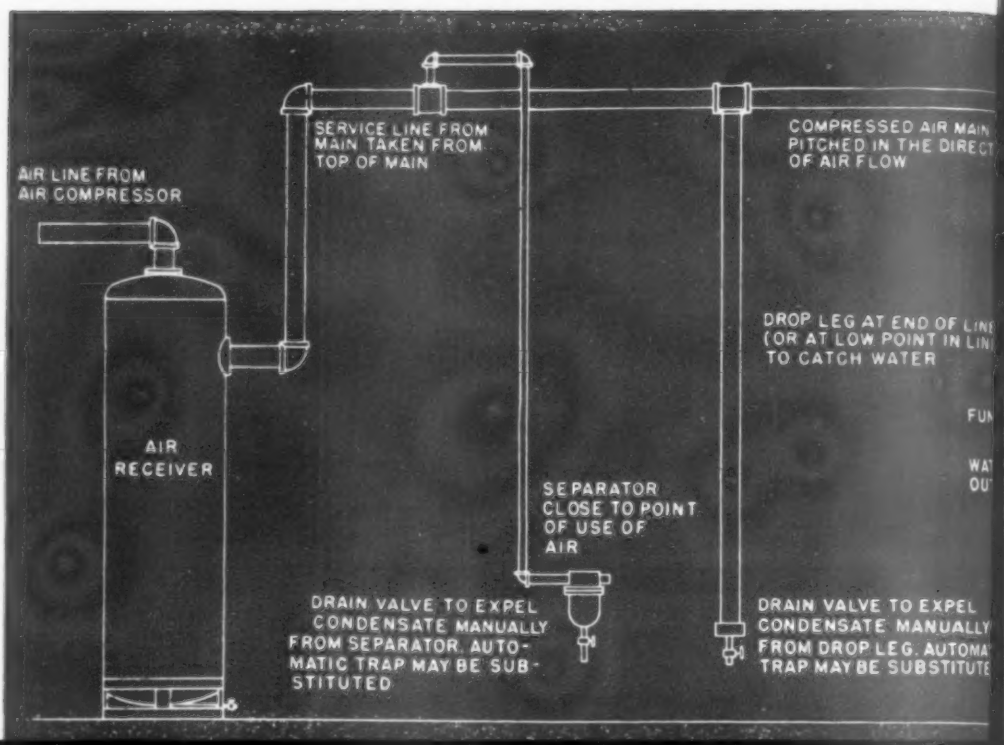
Aluminum patterns, pattern plates and dryer shells for the cores are made in the pattern shop where highly skilled patternmakers finish the various items to the highest degree of smoothness and accuracy of dimension. This is necessary for smooth, continuous and rapid operation of the molding machines. Molds are made on squeezer machines and on combined jolt (*Please turn page* 233)

Fig. 4—Aluminum dryer shells in almost infinite variety are stored on shelves in the coreroom

Fig. 5—New sand forms the crown on green sand cores in thin-wall castings with a diaphragm in the center

Fig. 6—Coreboxes are machined and fitted with watchmaking accuracy

Fig. 7—Sprue, runner and gates form part of the regular equipment on patterns


AIR LINE FROM AIR COMPRESSOR
SERVICE LINE FROM MAIN TAKEN FROM TOP OF MAIN
COMPRESSED AIR MAIN PITCHED IN THE DIRECT OF AIR FLOW
DROP LEG AT END OF LINE (OR AT LOW POINT IN LIN TO CATCH WATER
AIR RECEIVER
SEPARATOR CLOSE TO POINT OF USE OF AIR
DRAIN VALVE TO EXPEL CONDENSATE MANUALLY FROM SEPARATOR. AUTOMATIC TRAP MAY BE SUBSTITUTED
DRAIN VALVE TO EXPEL CONDENSATE MANUALLY FROM DROP LEG. AUTOMA TRAP MAY BE SUBSTITUTE

Sketch at left shows piping arrangement to obtain reasonably dry air at the point of use, without aftercooler and moisture separator installed. Right-hand sketch illustrates compressor installation with aftercooler and moisture separator, to obtain dry air in the lines

COMPRESSED AIR IS

COMPRESSORS don't make air wet, but compressed air certainly can be wet. Here is the reason.

All atmospheric air contains some moisture. When it is foggy, and when it rains, we see the moisture in the air. This is visible moisture. When the sun shines and we don't see the moisture, it is there just the same, but in lesser amount. This is invisible moisture, or vapor.

As the point of saturation is approached, the moisture becomes visible in the form of fog. When the air is completely saturated it is said to have a relative humidity of 100 per cent at that temperature. A lesser moisture content is expressed as a percentage of saturation.

The ability of air to carry moisture as invisible vapor increases as the temperature of the air is raised, and decreases as the temperature of the air is reduced. For every 20 F of increase of the temperature of air, its ability to carry moisture is approximately doubled. Conversely, with every 20 F of decrease of the temperature of air, its ability to carry moisture is cut approximately in half.

Relative humidity, therefore, has a direct relation to the temperature. Relative humidity of 80 per cent at 70 F would be only 40 per cent if the same air with its moisture were heated to 90 F.

This makes it easy to understand what happens when air is compressed. Suppose a compressor is delivering 200 cu ft of air per minute to a sand blast with ⅜-in. nozzle, at 80-lb gage pressure. It is summer, one of those hot, sticky days. The temperature is 90 F and the humidity is 80 per cent. This means that the air is carrying 80 per cent of the moisture that it can carry at 90 F. The air is 80 per cent saturated with this invisible vapor.

This air at 90 F and 80 per cent humidity contains 0.00173-lb of water per cu ft. The 200 cu ft of air that is drawn in by the compressor each minute will, therefore, contain 200 x 0.00175, or 0.35 lb of water. This is much more moisture than the air can carry, when compressed to 80-lb gage pressure, if the temperature of the air remains constant at 90 F.

However, the compression of air increases its temperature to a point so high that it will carry this amount of water as suspended vapor. This is true for both single and two stage compressors. All of the moisture is, therefore, carried through the compressor into the air receiver.

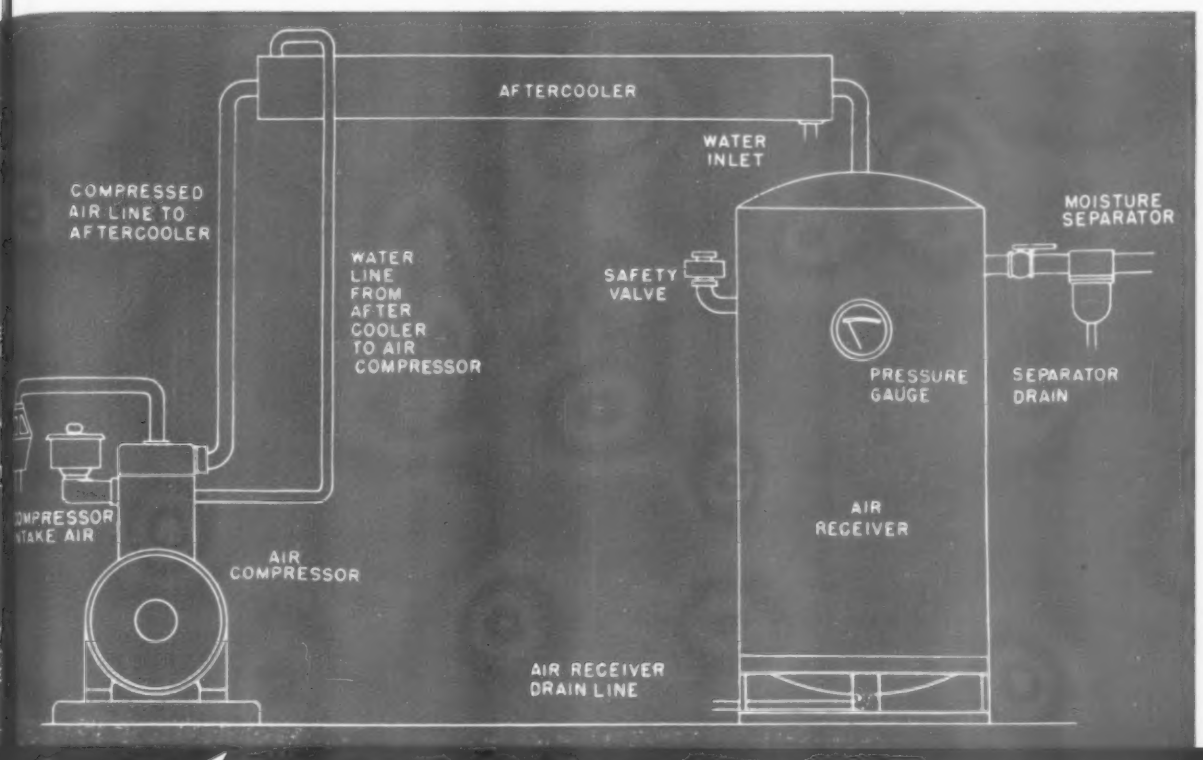
When this warm air in the air receiver and in the air lines cools to the room temperature, which we have assumed is 90 F, the air will be much more than saturated. About 80 per cent of the moisture (80 per cent of 0.35 lb), or 0.28 lb of water per minute, will be released and deposited in the receiver and air lines. This is about 2 gal of water per hour, for the 200 cu ft compressor, and 2 gal of water per hour really makes the air wet.

The elimination of this water is not difficult. We will discuss two methods.

1. If the processes for which the compressed air is being used do not require absolutely dry air, correct piping and draining will probably give air that is satisfactory.

If a vertical receiver is used, the air should enter at the top, so that all moisture will go directly to the bottom, where it will tend to remain. The line out of the receiver should be in the shell near the top. A drain must be installed at the bottom of the receiver, and this drain must be opened once every day to completely expel all accumulated moisture.

If automatic drainage is desired, an automatic trap may



ISN'T ALL WET

By GEORGE B. COMFORT
Schramm Inc.
West Chester, Pa.

be installed. The inverted bucket type of trap is usually preferred for air rather than a float type steam trap.

If a horizontal receiver is used, the air should enter at the head, and the outlet should be in the shell near the entrance head and at the top of the receiver. The drain, of course, is necessary at the bottom of the receiver.

The lines through the shop must be large enough to supply the machines and services with the required amount of air without undue drop in pressure. Many installations cause trouble because the pipe sizes are too small.

Air lines should be run with some "fall" so that any precipitated and deposited moisture will flow in the same direction as the compressed air, to a point at which it can be drained. At this low point, "drop a leg" where the water can be collected and drained by a hand valve or by an automatic trap.

When taking a line off the main to supply air for a tool or service, do not take it off the bottom of the main. Have the outlet tee "looking up." This requires the use of two elbows, but dry air will be taken from the top of the main, and any water will flow by, in the bottom of the main.

A moisture separator installed near the point of use of the compressed air will remove any water from the lines at that point and the air entering (*Please turn to page* 201)

Pipe Diameter (in inches) Required To Pass a Given Amount of Air at 100-lb Gage Pressure with Less than 1 lb. Drop in Pressure

Cu ft Free Air Per Min	Length of Pipe in Feet										
	50	100	200	300	400	500	750	1000	2000	3000	5000
20	¾	¾	¾	1	1	1	1	1¼	1¼	1¼	1½
40	¾	1	1	1¼	1¼	1¼	1¼	1½	1½	2	2
60	1	1	1¼	1¼	1½	1½	1½	2	2	2	2½
80	1	1¼	1¼	1½	1½	1½	2	2	2	2½	2½
100	1¼	1¼	1½	1½	2	2	2	2	2½	2½	3
125	1¼	1½	1½	2	2	2	2	2½	2½	3	3
150	1¼	1½	2	2	2	2	2½	2½	3	3	3½
175	1¼	2	2	2	2	2½	2½	2½	3	3	3½
200	1½	2	2	2	2½	2½	2½	3	3	3½	3½
250	1½	2	2	2½	2½	2½	3	3	3½	3½	4
300	2	2	2½	2½	3	3	3	3	3½	4	5
400	2	2½	2½	3	3	3	3½	3½	4	4	5
500	2	2½	3	3	3	3½	3½	4	5	5	5
600	2½	3	3	3½	3½	3½	4	5	5	5	6
800	2½	3	3½	3½	4	4	5	5	5	6	6
1000	3	3	3½	4	4	5	5	5	6	6	8

The Hot Blast C

This article comprises an address by the author before the Tenth Foundry Conference, Aachen, Germany, Jan. 21, 1943, and was translated by William W. McCulloch, American Cast Iron Pipe Co.

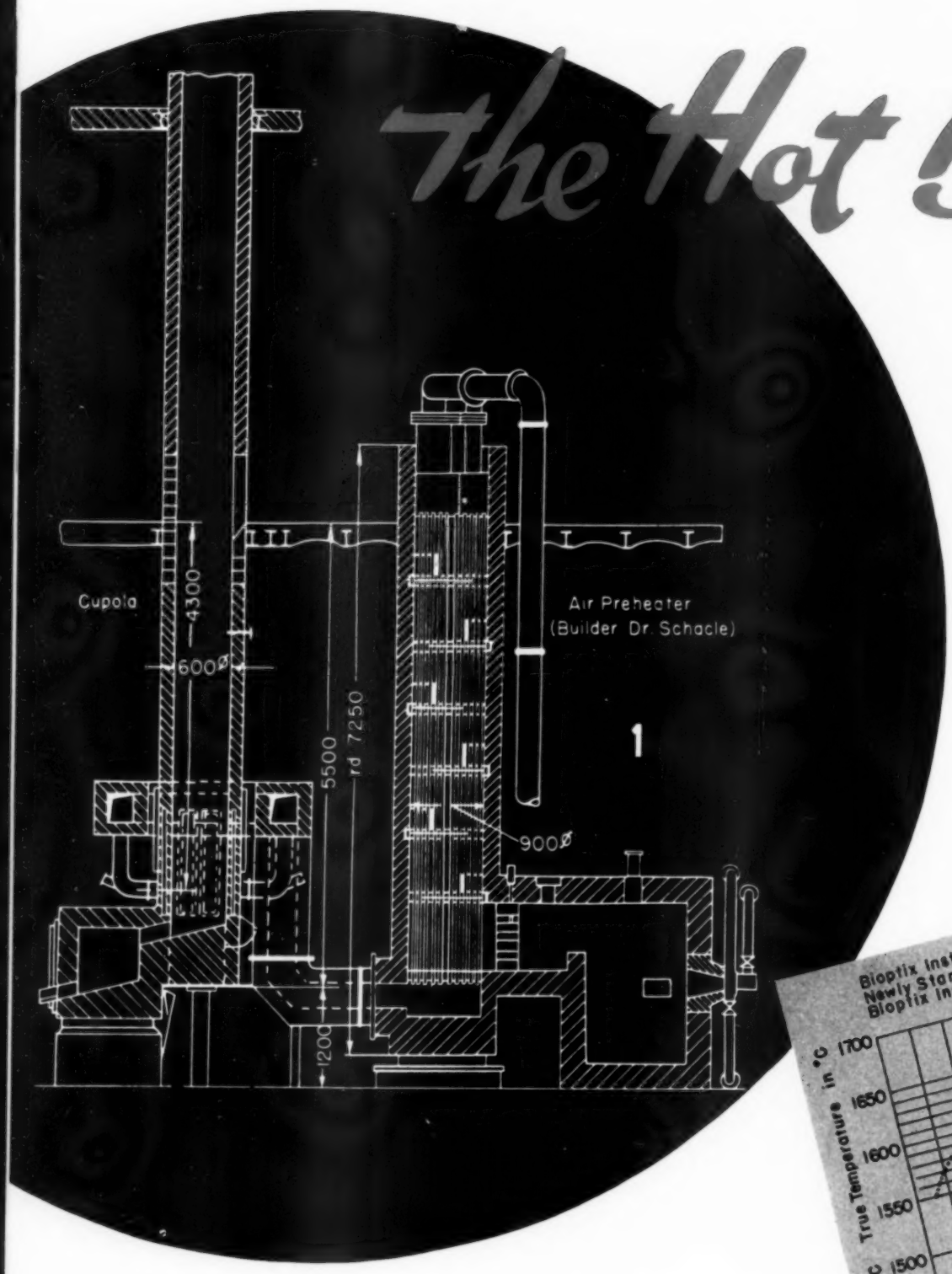


Fig. 1—First hot blast cupola of the A. G. der Eisen—und Stahlwerke, formerly George Fischer, Schaffhausen

Fig. 2—True and apparent tapping temperatures of malleable iron plotted against rising silicon content

Fig. 3—Effect of decreasing coke ratios on the melting conditions of a 420 mm (16.5 in.) cupola

Fig. 4—Diagram for determining the optimum cupola blast. Cupola capacity, 5 tons; efficiency 40 to 56 per cent; preheater efficiency, 80 per cent

By MARCEL BADER

Cupola

BY 1831 Faber du Faur in Wasseralfingen had already carried out experiments in the hot blast operation of cupolas; other works followed his example. Otto Vogel[1] included in his history of iron (*Geschichte des Eisens*) some structural details of hot blast cupolas which were in operation at the Sayn works in 1834. Following those days, the use of the hot blast in blast furnaces was established. Therefore, it seems peculiar that melting with a hot blast in cupolas was not carried to success, as in the case of the blast furnace, but was forgotten for long years after the first experiments and only recently was able to be carried through to greater success.

Thermal balances show that in poorly operated cupolas today up to 50 per cent of the combustible products, in the form of furnace gases rich in carbon monoxide, are allowed to pass to the open air. For this reason it is understandable that the use of this potential source of heat will be the subject of investigation again and again, especially in the sense of improving the thermal efficiency of cupolas.

The many hot blast cupolas which have been built in the course of the years and which have attained any importance may be collected together in four main groups:

1. Hot blast cupolas in which the blast temperature is raised by mixing the air from the blowers with gases drawn off from the furnace. Such cupolas remain without practical importance.

2. Hot blast cupolas in which the sensible heat of the furnace gases and the radiant heat of the furnace are used to heat the air from the blowers. Thermal considerations show clearly that with these cupolas neither large savings are possible nor are metallurgical advantages to be expected. As examples, we mention the Acipco hot blast cupola and the Mario Olivo[2] hot blast cupola. In the latter, "hot heads," heated by the radiant heat of the furnace, project into the interior of the wind box.

3. Hot blast cupolas in which the air blast is heated by the burning of cupola gases in a heater. The development of this hot blast cupola represents an advancement because the latent as well as the sensible heat of the furnace gases is used in heating the air blast.

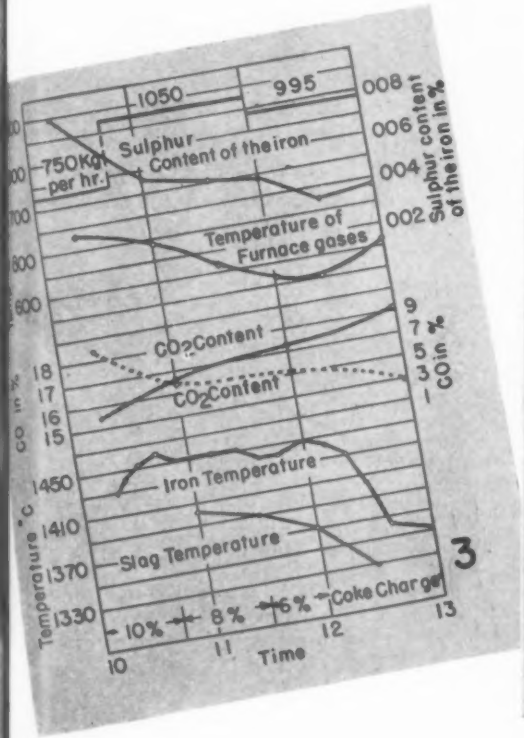
Process Has Limitations

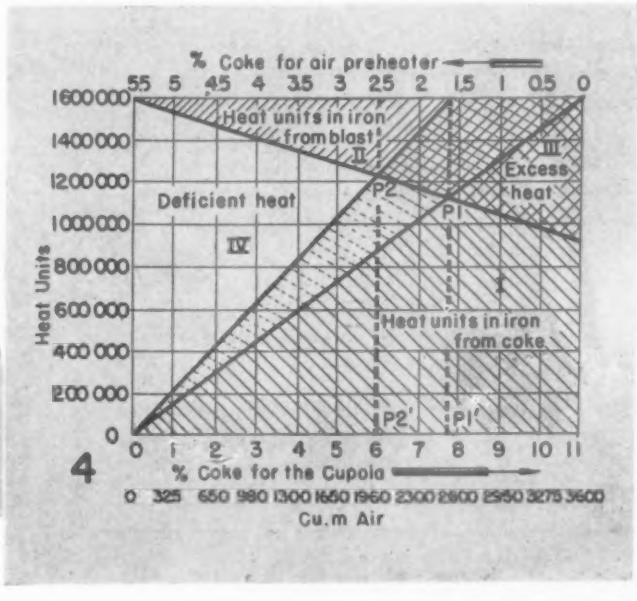
An example is the Griffin furnace[3] which works at blast temperatures of 250 to 300 C (480 to 570 F). Regarding this process the following may be said:

The more favorable the furnace gas ratios (higher CO_2 content), the more unfavorable becomes the sucked-off furnace gas (lower CO content) to be subsequently burned in the recuperator. A critical gas composition with minimum CO content will be reached at which preheating of the blast by the Griffin process can no longer be economically accomplished.

To this group also belongs the Schurmann furnace[4]; it takes a special place, however, because in it the gases of combustion that are still not reduced are conveyed again directly from the furnace.

4. Hot blast cupolas in which the cupola blast is warmed by a separately heated stove. Hot blast cupolas with separately heated stoves have a great advantage in the fact that the cupola blast can be blown into the furnace at the beginning of the melt at the desired temperature. Much more important, however, is the fact that the heating of the stove, in contrast to the Griffin process, remains fully





independent of the quality of the resulting cupola gases. Practically any blast temperature can be reached in a short time, and the desired temperature can be held constant without difficulty.

As examples we mention: 1. The Bradley hot blast cupola, with blast temperatures of 100 to a maximum of 200 C (210 to 390 F); 2. The Dawidowski[2] hot blast cupola, which works at a maximum blast temperature of 200 to 300 C (390 to 570 F); and 3. The hot blast cupola of E. Piwowarsky.

Piwowarsky[5] has summarized the experimental results obtained with his cupola as follows (Fig. 3):

"In melting with a hot blast of 400 to 600 C (750 to 1110 F), iron temperatures lying far above 1500 C (2730 F) could be measured.

"The coke charge can be lowered to about 8 per cent or lower; under 6 per cent an increasing risk of a freeze-up exists. The melting capacity of the expermental cupola could be increased over 100 per cent. The sulphur content of the melt could be strongly reduced; in a gray iron melt the sulphur was lowered from 0.08 to 0.03 per cent, and in a malleable iron melt it was lowered from 0.21 to 0.17 percent.

"In one experiment the temperature of the furnace gases could be observed to drop from 900 to 500 C (1650 to 930 F). Changes in the coke charge are noticeable in the composition of the furnace gases. For example, the CO_2 content of the furnace gases increases as the coke ratio decreases."

The A.-G. der Eisen-und Stahlwerke, formerly Georg Fischer in Schaffhausen, built in co-operation with E. Piwowarsky a hot blast cupola with which at least 5 to 6 metric tons of malleable or gray iron could be melted hourly. (Editor's note: 1 metric ton = 1.1 short tons or 2204 lb. Throughout this translation the word "tons" means metric tons.)

Piwowarsky's experiments showed that a 100 per cent increase of the cupola melting capacity is made possible with a hot blast of 600 C (1110 F). According to this, if we would melt about 5 to 6 tons at a blast temperature of 600 C, then the capacity of the experimental cupola in melting with a cold blast would amount to about 2½ to 3 tons.

In melting with a hot blast, melting occurs in the cupola with a reduced amount of coke; and, as against the cold blast process, the heat lacking for the melting and superheating of the iron is brought in by the blast. The diagram in Fig. 4 makes possible the calculation of the optimum blast volume, that is, that blast volume with an oxygen content sufficient to burn the coke in the cupola and with a heat content great enough to make up for the loss of heat caused by the reduction of coke in the furnace.

At a blast temperature of 600 C. (1110 F) the optimum wind volume lies at an assumed thermal efficiency (of the cupola) of 40 per cent in about a 7.7 per cent coke charge. On the basis of Piwowarsky's test results, the coke charged into the cupola can be lowered to approximately 6 per cent. From the diagram in Fig. 4, it is to be observed that this is theoretically possible if we compensate for the defiicient heat in some way. In this regard, two courses are theoretically open to us:

1. Holding the blast volume constant, we could raise the blast temperature above 600 C.

2. We could increase the thermal efficiency of the cupola from 40 to about 50 or 55 per cent.

The blast temperature cannot be raised over 600 to 650 C (1110 to 1200 F) because of reasons which we will state later; however, the thermal efficiency of the cupola will improve with further coke reductions because the proportion of CO_2 in the furnace gases increases. According to Jungbluth[6], the proportion of CO_2 is raised by the Nv and also by the thermal efficiency of the cupola. ($Nv = CO_2/CO_2+CO \times 100$) If we assume a thermal efficiency of 56 per cent, then it can be proved by calculation, on the basis of the diagram in Fig. 4, that the coke can be theoretically lowered to about 6 per cent.

6 per cent coke (5 tons) = 300 kg

$300 \times 0.9 \times 8080 \times 0.56 = 1{,}220{,}000$ Heat Units

1960 cu m wind at 600 C give $1960 \times 600 \times 0.323 =$ 380,000 Heat Units, or a combined total of 1,600,000 Heat Units.

Employ Water Cooling

Our experimental hot blast cupola[7] (Fig. 1) has a diameter of 600 mm (24 in.); the melting zone and the tuyeres are water cooled. In place of a wind box, the hot blast pipe is placed around the furnace in a ring, as in the case of the blast furnace. The hot blast pipe is insulated. The tuyeres are round in order that the tuyere connections can be easily introduced and interchanged, as in the case of the blast furnace. The forehearth is designed to hold 1½ tons for a melting capacity of 5 to 6 tons. Since malleable iron and gray iron have to be melted, the furnace is so constructed that the bottom—the distance from the bottom to the lower edge of the tuyeres—can be changed. By this arrangement, we can melt at any time an iron with

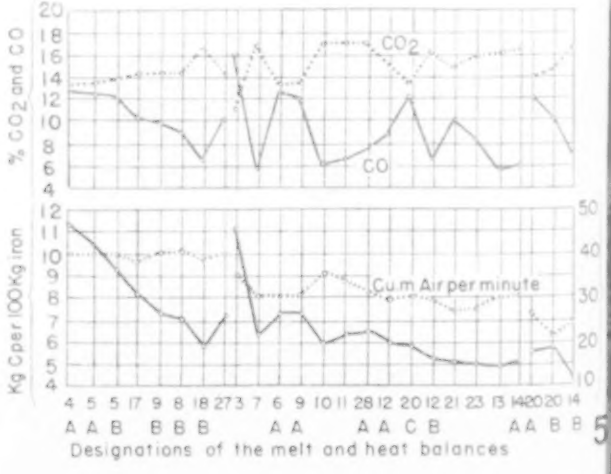

% CO2 and CO
CO2
CO
Kg C per 100 Kg iron
Cu m Air per minute
4 5 5 17 9 8 18 27 3 7 6 9 10 11 28 12 20 12 21 23 13 14 20 20 14
A A B B B B A A A A C B A A B B
Designations of the melt and heat balances

Fig. 5—Furnace gas analysis with decreasing coke ratios

Fig. 6—Melting capacity as a function of decreasing coke ratios and increasing blast temperatures

Fig. 7—Total savings with decreasing coke ratios

Fig. 8—Thermal efficiency of cupola and of entire system with decreasing coke ratios

a higher or lower carbon content.

Through the foregoing coke charge calculation, the wind volume and, therefore, the size of the blast heater are determined. For the execution of the experiments with the test cupola, a preheater with an hourly capacity of about 2500 m^3 (88,000 cu ft) of hot blast would have sufficed. However, a heater of the Dr. Schack type was selected by us out of practical considerations for its capacity of 3600 cu m (127,000 cu ft) of hot wind at 600 C (1110 F).

The measuring equipment consists of two platinum vs platinum-rhodium elements in the combustion chamber of the blast heater, and two nickel vs nickel-chrome elements for the hot blast and the exhaust gas from the blast heater. Temperatures are registered by means of two recorders. The first is for the measurement of the temperature in the fire box and the second for the measurement of the hot blast temperature and the temperature of the exhaust gas from the heater.

Adjusts Air Temperature

Schack has fitted two pipes to the upper part of the fire box of his heater, so that cool air can be introduced if the temperature in the combustion chamber gets too high, particularly in front of the bundle of tubes. To that end, one of the two thermocouples in the combustion chamber operates a temperature limit regulator. The latter is set so that it operates at the predetermined highest temperature. For example, if the temperature of 950 C (1740 F) is exceeded, the temperature limit regulator opens a motorized throttle valve in the combustion chamber air piping. This permits cool air to flow through the two cool air pipes until the temperature in the combustion chamber again drops below 950 C.

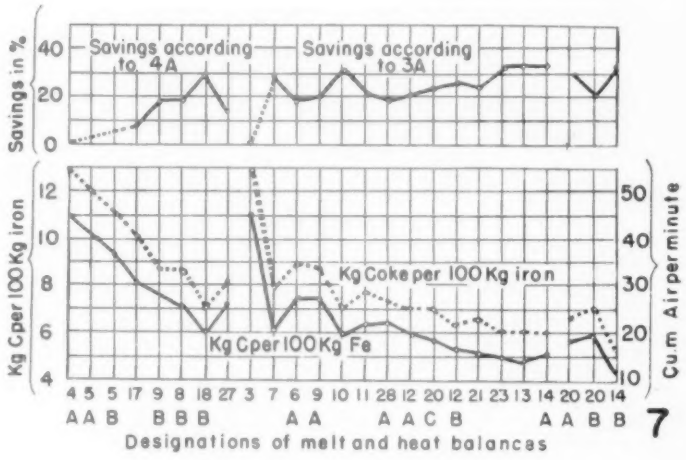
A flow-type pyrometer is used for measuring the furnace gas temperature. The cupola blast and the gas for the heater are each measured with a water gage. Moreover, the cupola blast, the gas for the blast heater, and the primary and secondary wind for the blast heater are each measured with a micromanometer.

In one principal group of experiments we had to determine to what degree the amount of coke could be reduced in the melting of malleable iron if the blast temperature at a constant blast volume was raised from 0 to 600 C (32 to 1110 F). These experiments were carried out with blast volumes of 25, 30, and 35 cu m per min (880, 1060, and 1240 cu ft per min). In a second group of experiments we raised the blast temperature from 0 up to 300 to 400 C (570 to 720 F) and, with constant wind, lowered the coke charge from 13 to about 8 per cent. Afterwards, the coke charge was held constant at 8 per cent and, again with constant wind, the blast temperature was raised from 300 to 600 C (570 to 1110 F). These experiments were also carried out with varying wind volumes.

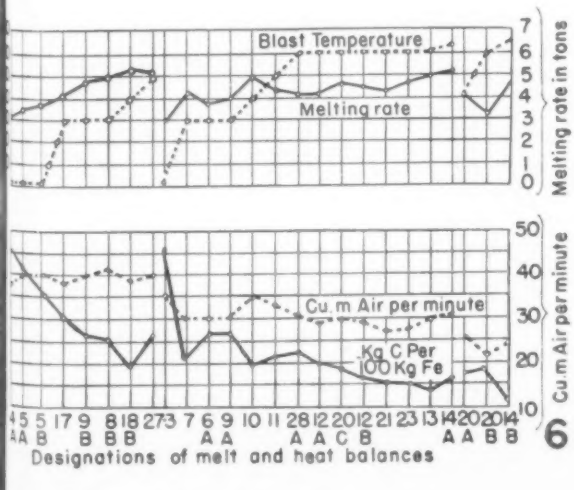
It is important to note that in the execution of the experimental melts we did not hold to a rigorous experimental program. We were compelled always to run the cupola so the liquid iron produced could be cast in the foundry.

Our temperature measurements with the Bioptix show clearly that a definite relationship exists between iron temperatures and the chemical composition of the malleable iron melted, since very definite iron temperatures were measured according to the height of the silicon content. Hence, we have ascertained that the apparent iron temperature is never over 1410 C (2595 F) if the silicon content of malleable iron amounts to 0.5 to 0.6 per cent. The highest iron temperatures are measured, then, when the silicon content is over 0.8 to 0.9 per cent. K. Fitterer[8] also ascertained a similar dependence between silicon content and iron temperature using a silicon-carbide thermocouple.

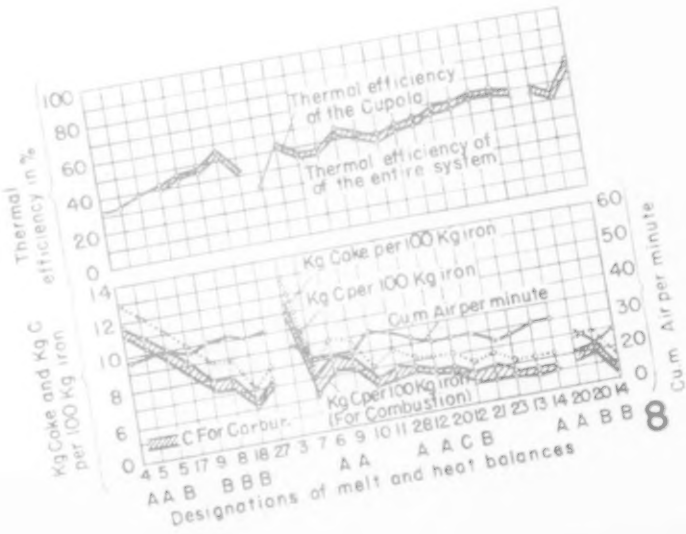
As Fig. 2 shows, the tempera- (*Please turn to page* 252)


Savings in %
Savings according to 4A
Savings according to 3A
Kg C per 100 Kg iron
Kg Coke per 100 Kg iron
Kg C per 100 Kg Fe
Cu m Air per minute
Designations of melt and heat balances

7


Blast Temperature
Melting rate
Melting rate in tons
Cu m Air per minute
Kg C Per 100 Kg Fe
Designations of melt and heat balances

6


Thermal efficiency in %
Thermal efficiency of the Cupola
Thermal efficiency of the entire system
Kg Coke and Kg C per 100 Kg iron
Kg Coke per 100 Kg iron
Kg C per 100 Kg iron
Cu m Air per minute
Kg C per 100 Kg iron (For Combustion)
C For Carbur.
Designations of melt and heat balances

8

GI foundrymen sometimes had to resort to numerous expedients but they turned out the castings. The author, formerly foreman of the U. S. Army Engineer Foundry Unit Training Staff, has abstracted his article from personal letters from John A. Gemlo of 1799th Engineer Foundry Unit, New Guinea

GI FOUNDRY IN THE SOUTH PACIFIC

By RICHARD P. DUNPHY
Assistant Metallurgist
Naval Research Laboratory
Washington

THE DIFFICULTY of maintaining long supply lines during a war is well recognized. Battles have been won or lost depending on the supply of materials, ammunition, and equipment to the places where they were needed most. Realizing this fact, the Army Engineers during the war developed and trained Foundry Units for duty in overseas theaters. Their main function was to aid in the supply of parts to keep Engineer and allied equipment in the field. The job they did further attests to the ingenuity, hard work and diligence of American men.

The particular unit described here was destined to operate in the South Pacific theater where not only the dark oppressiveness of the jungle, disease and lack of materials influenced its activity, but snakes, rain, wild pigs and inquisitive natives presented production problems. Many a mold was ruined by a careless step of a native, or even by their own men upon being surprised by a too friendly snake. The wild pigs roamed at leisure at night in the makeshift foundry and often spoiled many days work until active measures were taken to eliminate this "Operation Pork."

The unit was trained in the fundamentals of Army foundry work in Louisiana. The equipment with which the men were to be supplied consisted of a 200-lb induction furnace powered by a 60 kw diesel-generator, hand molding tools, a grinder, three snap flasks, pattern lumber, melting stock, and a pat on the back. The outfit consisted of five molders, two patternmakers, two furnace operators, one coremaker and five other men, one of whom had to be a morale builder of the Jimmy Durante type who helped them forget about home and the States during what little leisure time they had.

If things had gone according to plan, their troubles would have been halved. But they didn't have the luck of the Irish, and before they landed on New Guinea, a Jap plane had sent their equipment to the bottom of Davey Jones' locker where, they now suspect, he is gleefully using it to make anchors and propellers for the bulk of the Jap navy and air force. This disaster gave them little hope of getting sent back to the States—no, nothing as easy as that. They were ordered to carry out their ordained mission anyway. They were assigned to a Heavy Shop Company (machine shop) which wanted castings—in a hurry! Bulldozers, road graders, cranes, trucks, and all sorts of vital equipment lay idle for want of spare parts—most of them castings. The foundry boys went to work and put many of them back in service. Here's how:

Sand and melting equipment were their first concern. Luckily, some suitable sand was found near their billet but it happened to be directly under a latrine. Much searching failed to find a suitable deposit elsewhere. Not too much difficulty was encountered moving the latrine, so one objective was accomplished. They stole a few tents and erected the first GI foundry on New Guinea. About a ton of coke was discovered at an abandoned dock, so they built an oil-drum cupola and with a few pieces

of baling wire, welding rod, local clay and two air compressors they had hot iron pouring into molds in short order. They tapped about 150 to 200 lb every ten minutes. Too often to mention, though, they had to shut down and reline the cupola and weld up places in the drum where the iron had leaked through the lining.

When the supply of coke ran out, they had to rely on an oil-fired furnace and substitution was their by-word. Every iron or steel part that came to them for repair was immediately replaced with bronze or aluminum from scrapped Jap and American equipment. After a while, it was not uncommon to see jeeps and pieces of Engineer equipment oddly equipped with bronze oil pans, gears, nuts and bolts and aluminum steering wheels, toggle rods, gear shift levers, and gear housings.

The molding equipment was an odd assortment of hand tools made from pieces of mess kits, spoons, bent knives and what few pieces they had the time to make by forging them from pieces of steel scrap. Flasks were made from any lumber they could get their hands on, and it is suspected that many an outfit on New Guinea was short of prefabbed barracks, the lumber from which was being put to use in that GI foundry. Two convenient sizes of snap flasks were improvised, and metal jackets were made from scrap aluminum sheets.

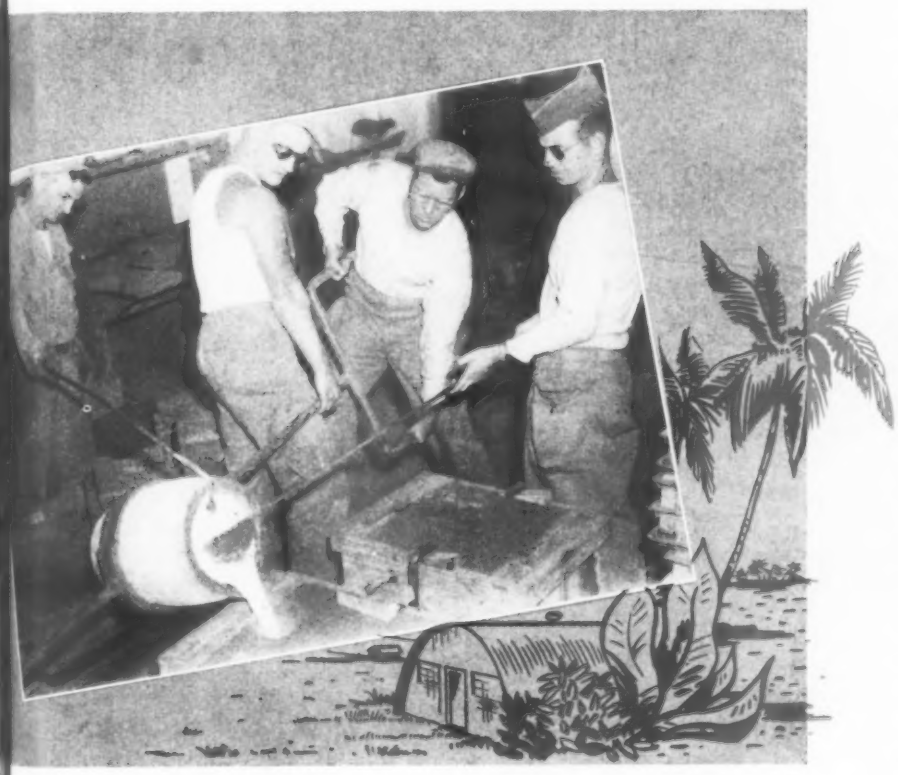
The oil-fired furnace presented a few interesting difficulties. At first, the men were fortunate in hearing of the approach of a Navy supply vessel near their location and with a little horse-trading (the sailors wanted Jap souvenirs) they managed to acquire two crucibles. These were used simply by placing them inside a clay-lined oil drum with a clay lid, using an oil burner for heat supply. The lid acquired the exasperating habit of cracking and falling into the crucible just when the heat was ready for tapping. This difficulty was eventually surmounted by using a metal lid backed up with clay and replacing it each time it burned out.

The oil burner was a converted "steam jenny"—a gasoline-motor-driven blower and oil burner unit intended to be used for producing steam for cleaning tank cars and other equipment. The unit was redesigned or rebuilt so that the fuel line was wrapped around the burner nozzle in an effort to utilize some of the waste heat in preheating the fuel oil. It worked very satisfactorily and it was found possible to melt 200 lb of bronze in about three-quarters of an hour.

When the crucibles finally gave out, though, their troubles began again, for the furnace had to be redesigned in favor of one which required no crucibles. After many trials and many errors, during which time burned hands and singed eyebrows were commonplace occurrences to be taken as philosophically as Jap air raids, a rocker type of furnace was built. The whole furnace was placed on rollers and in the absence of a power-driven rocker, motion was supplied by a strong back, and the charge was effectively rocked back and forth during melting. Here again the lack of proper refractories offered the biggest source of trouble, but with careful operation, about six heats could be taken out before the lining cracked so badly that relining was necessary.

The use of the broken part of a piece of equipment for a pattern proved to be the expedient necessary in most cases for making the actual mold. The required molding techniques involved the use of false cheeks, drawbacks, fitted cores (made with binders of motor oil, clay, or cement) and anything possible to facilitate drawing the pattern. In a few cases which absolutely required a pattern, the patternmakers shaped them by hand or by using what machine tools they could in the nearby machine shop.

After finding another limited supply of coke, an attempt was made to make a steel heat. A few parts absolutely requiring this metal prompted this attempt and, although it was unsuccessful, it again shows the ingenuity of the men in the unit. Considering the quantity of metal required, the thermit process was a possibility but discarded; the aluminum was available but preparation of the iron oxide was too lengthy a process. Consequently, it was decided to use the converter principle. Molten iron was taken from the cupola and (*Please turn to page* 254)



***Left*—This oil-drum cupola was improvised at a New Guinea foundry when the original equipment for the Army Engineers' unit ended up on the bottom of the ocean. It provided 150 to 200 lb. of hot metal every ten minutes. *Right*—Pouring a bronze casting. Note the Navy crucible**

By VINCENT DELPORT
European Manager
THE FOUNDRY

French Founders meet in annual convention

A SIZABLE attendance followed the technical sessions at the twentieth convention of the Association Technique de Fonderie of France, the second since the end of the war. Leading personalities from the foundry associations of several foreign countries added by their presence to the almost prewar atmosphere in which the meeting took place. Success would have been complete but for the absence through illness of the president of the French association, Paul Bastien, and of Prof. Albert Portevin, who always takes a leading part in the proceedings of the convention.

The meeting lasted two days, during which 14 papers were presented and discussed. These included three official exchange papers from Belgian, British and American associations. A special meeting of representatives of the technical foundry associations of friendly nations was held, at which it was decided to revive the International Committee of Foundry Technical Associations. This meeting took place in accordance with a unanimous resolution passed at an informal meeting of foreign delegates held during the Cleveland AFA convention in May.

The opening session, Friday, Oct. 18, was presided over by Mr. Olivier, president, Syndicat General des Fondeurs de France, who pointed out that the organization of the convention was the result of the co-operation of the Association Technique de Fonderie, the Centre Technique des Industries de la Fonderie, the Ecole Superieure de Fonderie, the Syndicat General des Fondeurs, and various training centers. Thus the convention was supported by the whole foundry industry represented by its various organizations, united for one purpose.

Mr. Olivier mentioned that 15 apprentices had been selected from various provincial centers; these apprentices were invited to take part in the discussions, and tests had been organized at the Renault works during the meeting. Prizes were awarded to those obtaining the best results.

The convention was held on the premises of the Association Technique—home of the foundry trade. However, the attendance had reached such large numbers that, in future, another venue would have to be chosen. Membership of the association, according to Mr. Olivier, has reached 1700. In a passing reference to the proposed reorganization of the International Committee, he said that the activities of the association would increasingly link up with the activities of similar associations in other countries.

Mr. Keller, first vice president of the association, spoke on behalf of the president, Paul Bastien. He welcomed the foreign visitors and expressed the pleasure of the association members at seeing among them again a number of their prewar colleagues who had withstood the vicissitudes of the war. Mr. Pons, speaking on behalf of Mr. Le Rolland, director of Technical Education at the ministry of Education, gave an official welcome and expressed the director's wishes for the success of the meeting.

An address was then given by P. Ricard, first vice president of the Syndicat General des Fondeurs. He stressed the dissemination of the industry geographically and on the variety of work done by the 1800 foundries scattered over France. Twelve per cent, or 220 foundries, have more than 100 workers; 50 per cent, or 900, have less than 20 workers. Referring to the great variety of work done even in small foundries, the speaker said there should be more specialization, as the present situation gives rise to too great a dispersion of effort. Largely as a result of the war, a large number of foundries are not sufficiently equipped and require modernization, allowance being made for a few very good exceptions.

With regard to technical developments, a number of foundries are well ahead, but too many are backward. For the past 15 years the foundry organizations made strenuous efforts to propagate greater knowledge among the foundries. Today the basis of the foundry organization in France is the entente between the various specialized sections of the industry. These sections have been formed, voluntarily, according to specialties such as malleable iron, cast steel, bronze, light metals, etc. Together they endeavored to reduce the variety of patterns, to pool technical knowledge and to stimulate export trade.

To help financially the small and medium foundries in their efforts to become modernized, a "Societe de Cautionnement Mutuel," a sort of finance corporation, has been formed, disposing of a fund of 3,000,000,000 francs ($25,000,000) lent by the government. In regard to education, the Ecole Superieure de Fonderie, for the training of foundry engineers, is very much alive, and 45 students have been graduated this year. In all foundry centers training courses have been organized for apprentices.

Mr. Ricard mentioned the Centre Technique des Industries de la Fonderie, a semipublic body, the council of which comprises representatives of the industry named by the Syndicat General des Fondeurs, representatives nominated by the government, and three representatives of the managements and technicians nominated by the CGT or French labor organization. The Centre Technique disposes of important funds collected by means of a small levy on turnover which (*Please turn to page* 188)

pattern rigging for production molding

By F. C. RIECKS
Foundry Division
Ford Motor Co.
Dearborn, Mich.

IN THE development of modern methods for production casting, the use of matchplate and machine molding has grown enormously. The matchplate type of pattern consists of a common pattern plate located between two halves of pattern and constructed with locating bushings on each end to receive the flask with its fixed pins, accurately placed so that both pattern plate and flask fit properly. The construction of this type of pattern must be agreed on by both the pattern and foundry divisions so that, once decided, there is no further guesswork regarding the parting line and, if properly executed, there will be no question of miss match of the cope and drag sections of the castings.

The one very important point of any molding operation is the draw or vertical movement used in stripping the mold from the pattern. In matchplate work, this is usually done by vertical guides provided by slip-fit pins. For machine molding, guide bars are used to allow for stripping without any undue unsteadiness.

Unlike jobbing patterns, which are made of wood for ease of handling and low original cost, machine molding is now invariably done with metal patterns, where the weight is of no factor with automatic or other machine operated lifting devices. This matter of mechanically stripping of the mold relieves the molder of much unnecessary work but was devised primarily for the resulting mass production which could be acquired by eliminating manual handling.

The type of molding machine to use on a particular job depends a great deal on the actual requirements needed to do a proper job of casting. Jolt squeeze and strip machines or jolt squeeze and pin lift are used to a large extent depending on the work involved. There are many other types of molding machines, such as matchplate machines, core machines, etc., with the essentials about the same in all cases. In order to obtain the proper operating results, it is absolutely necessary that each application be given the proper study, considering parting lines, production requirements, whether bars are necessary in the flasks, and other considerations. Some of these factors will control the method of shaking out the casting. If sandslingers are chosen instead of straight molding machines, the type of machine will be quite different and usually simpler. A correct analysis of the job should be made while the patterns are being built so that a final choice of the manufacturing method is made before the patterns arrive in the foundry.

In the actual molding operations, several detail items affect molding technique and the use of patterns—some of which could be mentioned here. To prevent pattern sticking, a fine kerosene spray is used on the patterns. Sometimes, particularly in the winter, the heat from strip heaters is needed to allow for a good stripping operation. Of course, the most usual aid to stripping is the use of vibrators and this is found to be necessary for the good operation of many usual type molding machines.

At Ford we have a number of sandslingers in operation such as on the cylinder block, tractor castings and cores on turntables. We usually use, on green sand molds, a plain pin lift strip machine to which the pattern is fastened, and the flask is then filled by automatic or manually handled slinger heads. With great quantities of castings to be made, this type of molding can be best adapted to a turntable where a number of patterns may be mounted, which allows for the men to be stationed at given places to do their respective operations. The work naturally travels from and to the men with a minimum of movement by the men. The operators naturally become very familiar with their duties and can easily do the necessary operations without being experts at foundry work. Only one man needs to know his work thoroughly and he is the slinger operator. Even this operation can be made automatic if so desired.

On the cylinder block job, we have standardized on sandslinger molding. Several reasons have been used in establishing this policy but we can state positively that floor space is a big factor, also the elimination of noise and foundation troubles. The ramming of V-8 cylinder molds is done on eight turntables all equipped with five air pin-lift machines each, all the sand being fed through sandslingers—one located at each turntable. Each one of these slinger turntable combinations produces an average of 100 molds per hour or two such installations, one for cope and one for drag, results in casting of an average of 100 cylinder blocks per hour.

Patterns for this job are installed on air pin-lift machines with locating pins, one on each end of the pattern plate to receive and locate the flask for perfect alignment. After ramming the flask, the table has reached the point of lifting the flask from the pattern; this is done by the operator who throws the air valve handle to lift position. This strips the mold from the pattern, the next operation being to lift and transport same from the molding machine to the molding conveyor. Four sets of these lines can average 400 castings per hour. (*Please turn to page* 234)

Questions and Answers

Use Old Castings as Patterns

Q.—We have been called upon to make a number of stove bowl castings and to use the old bowls for patterns. The old bowls are rough, burned, distorted and generally in bad shape. Only one new casting is required from each. Can you suggest any paint or other material to spread over the surface of the old castings which might be sandpapered and varnished to facilitate making the molds?

A.—At one time or another probably every jobbing foundry has used old castings for patterns. Obviously the job has to be handled by a skilled molder who will require more time than if he had a proper pattern. Several methods and materials are available for improving the surface of the old casting. Method and material will depend to a considerable extent on the existing condition of the old casting.

If the casting is in fair condition it may be covered with paper, or with one or two coats of shellac. In other cases it may be advisable to spray or paint the surface with plaster of paris, or a proprietary material for making patterns that resembles stone. Putty, fireclay and wax may be employed to fill out deficient areas. A well known metallic compound for patching surface defects on castings may be employed. Where the old casting is in extremely bad shape, cracked, warped, and with glaring gaps here and there, it may be advisable to make a lead casting, and then make a new mold from this pattern. The mold for the lead casting will require more or less cutting and carving the sand by the molder. After it is cast the lead pattern readily may be hammered and finished to the desired shape and degree of accuracy.

Applying Enamel to Aluminum

Q.—Can you tell us how we can obtain a smooth hard coating on aluminum patterns by use of an enamel?

A.—Your request for a coating for aluminum patterns is rather odd since it seems to us that the aluminum will be more resistant to sand abrasion, moisture, etc. than an enamel, varnish or paint. However, to secure good adhesion for any of those materials it probably will be advisable to prepare the surface carefully. First the aluminum should be cleaned with one of the alkaline or phosphate detergents recommended for aluminum. After rinsing and drying thoroughly, a priming coat of zinc chromate, or zinc chromate and iron oxide priming paint, should be applied. When that is dried completely almost any durable paint or enamel can be applied, and probably one of the lacquers or coatings developed for wood patterns might be best for the purpose. For more definite information on your problem we suggest that you write to some of the leading manufacturers of enamels, lacquers, paints, etc.

Soil Pipe Core Is Not Blown

Q.—In our practice we make rain water and soil connections with half dry sand cores topped with green sand. We have heard that in some foundries an arbor is used and green molding sand is blown into the corebox. We mold our rain water pipes four in a box rammed by sandslinger and cast them with down gates and runners from a three-lip ladle suspended from a monorail. We shall appreciate a description of the most modern American practice in the production of these castings.

A.—With the single exception that American foundrymen use all green sand cores, instead of the green sand tops on dry sand half cores, general practice in American soil pipe foundries is similar to yours. Description of soil pipe plants, methods and equipment have been presented in many issues of THE FOUNDRY. We can refer you to the issues of June and July, 1946, containing a description of old and new methods in a prominent Montreal foundry. If further back copies are available you will find articles in the following issues: Sept. 15 and Oct. 1, 1930; Feb. 1, 1931, p. 71; March, 1931, p. 77; February, 1935, p. 30; September, 1939, p. 24; October, 1939; October, 1944, p. 96.

Up to the present we have not seen or heard any instances of soil pipe cores formed by blowing molding sand into the corebox. It is possible, of course, but while the green sand coreblowing method is employed (see issue of March, 1942) in one or two places, it is not used in soil pipe shops.

Trouble With Plaster Molding

Q.—For some time we have been making molds for plastics from aluminum and zinc alloys poured in plaster, but now find that to obtain the desired surface on the plastic, it is essential to plate the mold surface. We have found that electro plating zinc and aluminum where cavities are involved, is difficult and unsatisfactory. Therefore, we thought that use of brass or bronze might solve the problem. However, when we tried plaster molding we found that material was not strong enough to resist the heat. We would like to have your recommendation as to a suitable molding material, bearing in mind that we desire surfaces as smooth as possible to obtain without pinholes, shrinkage, cracks, etc., so that the casting can be easily cleaned, polished and plated. What would be the best alloy to use?

A.—Since a number of firms are using gypsum cement or plaster successfully in the production of brass and bronze castings, it appears that a careful check of procedures employed may reveal why you encounter trouble in making satisfactory molds. Our suggestion would be to get in touch with your supplier of plaster and secure his recommendation on type and method of handling. You do not state definitely what difficulty you had so we can only guess at possible causes. It may be that you did not give sufficient time for proper drying, and the steam

formed by contact with the higher temperature bronze caused fluttering or agitation.

Possibly the difficulty may be in melting the brass or bronze used. If melted under conditions where the alloy tends to absorb gases of combustion, the gases will endeavor to escape during solidification, and some of it will be caught near the surface, giving rise to pinholes. Gating is as important in plaster molding as it is in sand molding, although it is possible and preferable to use smaller gates since the molding material acts as an insu-tor. Principles of directional solidification and proper eeding of heavy sections must be followed or good castings will not be obtained.

As far as specific alloy is concerned we believe that the 85 per cent copper, 5 per cent tin, 5 per cent lead and 5 per cent zinc composition will serve your purpose satisctorily since with care in melting it gives sound castgs which machine well. The castings also will possess a fair tensile strength.

You mention that the molds must be plated before use, and it might be well to point out that plating of objects where considerable difference exists between the various planes of the surface to be covered may not be satisfactory unless anodes of reverse contour are used.

Mention of plating brings to mind another procedure of obtaining a smooth surface mold which we understand s being used to some extent for the work you have in mind. Termed electroforming, the method is to make a plaster model or pattern which is shellacked or coated a thin layer of paraffine wax. If shellacked, a thin orm coat of bronze or similar metal powder is applied le the shellac is still tacky. With wax, a coating of aphite is applied. The coated pattern is immersed in plating bath as the cathode, and a shell of metal deosited. The shell is removed and backed with white ·etal to provide the necessary support for use.

Methods for Tinning Cast Iron

Q.—We shall appreciate any available information on the subject of tinning cast iron.

A.—The subject of tinning cast iron was covered in a comprehensive manner in a paper by R. A. Cresswell before the British Iron & Steel Institute.

It describes two new methods of preparing cast iron which involve treatment in molten salts. In the chloride method the article is immersed in a fused zinc-chloride-sodium-chloride eutectic mixture at 575 to 662 F followed by dipping in molten tin, covered with a layer of the same fused salt mixture at 572 F. This method is said to provide adherent, protective coatings of tin on cast iron that has been well cleaned mechanically. The chloride method can be adapted to tinning by wiping.

The nitrate method was developed to give tightly adherent tin coatings. Procedure includes light pickling in acid to open up graphite flakes; immersion for 15 minutes in fused sodium-nitrate-potassium-nitrate eutectic mixture at 572 to 662 F to oxidize surface graphite; pickling in dilute hydrofluoric acid to remove the scale formed by the nitrate bath; fluxing and tinning. Both fused salt methods have been used on a commercial scale. The fused nitrate method applies where good adhesion is essential. Where appearance is important the fused chloride dipping method is satisfactory. Both methods have been used for tinning small iron casting components to facilitate subsequent assembly by soldering or sweating.

On the whole the nitrate process is preferred for tinning cast iron by dipping and the chloride process for tinning by wiping. The chloride method is satisfactory for dip tinning castings that are sound and well cleaned mechanically. Either can be used for coating cast iron with tin-lead alloys by hot dipping.

Desires To Make Pouring Tile

Q.—When making gray iron castings from a wood pattern, the practice has been to create an opening into the mold after the pattern has been removed so that the molten iron can be poured. In practice this is an unsatisfactory method because the weight of the molten metal against the side wall causes it to cave in. However, a tube or something similar made from a highly refractory ceramic built into the mold will allow the pouring of the molten metal without causing the sidewalls to crumble or break. We are anxious to determine the type of clay used in making such pouring gates for cast iron molding practice. Is there a deposit of necessary materials to make this pouring gate available in Texas? What process is used in making those pouring gates?

A.—So far as we are aware, the practice of using pouring tiles, as they are termed, in the production of gray iron castings, usually is employed only with large, heavy castings where large quantities of molten metal pass over the same area, and where it would be difficult to form a runner by ordinary ramming methods—for example a

GANGWAY!

By J. A. Patterson

"You goofs! Even should I agree to mix up your punch for the chapter party tonight, I couldn't—it ain't that kind of a mixer."

bottom gate through which the metal enters the bottom of the mold cavity. Such tiles are available from various refractory shape manufacturers, and in our opinion, it would be much cheaper to buy them than to try to make them yourselves.

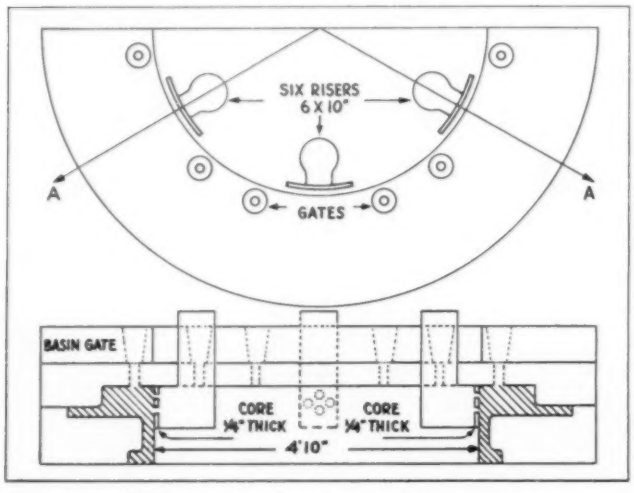
Pouring tiles are made from highly refractory clays which possess a certain amount of plasticity in the green state so that they may be extruded in the desired shape. The tile then are placed in kilns where they are fired under gradually increasing temperatures until vitrifaction takes place. Thus, you see the production of suitable pouring tile requires considerable equipment and knowledge of the art.

Incidentally, it might be pointed out that the trouble encountered with the sprue in green sand results not from the weight of metal, but from its heat and erosive tendencies. In other words, the heat tends to destroy the bond in the sand, allowing the sand to be carried away in the metal stream. Likewise the eroding action of the metal stream washes or cuts the sand.

Replace Top With Side Risers

Q.—The attached sketch shows a heavy 4000-lb cast iron ring 4 ft 10 in. inside diameter, 7 ft outside diameter and 13 in. high. Metal is to be poured into the mold through a ring of pop gates in the covering core. We shall appreciate your opinion on the number and size of risers required to insure a solid casting.

A.—Possibly four risers would serve, but since apparently it is a one-off job, prudence suggests the use of six spaced equidistantly. They could be placed on the top or preferably on the side inside the ring. Whether on the top or the side, the 6-in. riser is connected to the casting through one or more small openings through a thin, flat



Sketch, not drawn to scale, showing the arrangement of gates and risers for pouring large circular casting

core. With this arrangement the riser will function satisfactorily and may be removed readily by a blow from a hammer.

In this particular instance the side riser is to be preferred since it will not interfere with the circular runner basin serving the ring of pop gates. If it was not so risky, the ideal method of gating would be through the risers. The risky feature is the thin core between riser and casting. The metal pressure might break the core or force it out of place. The accompanying sketch, with certain features exaggerated and not drawn to scale, shows the method of suggested riser application. Gate openings and riser openings are formed in the covering core. After the mold is closed and weighted or clamped a suitable container is placed on top in which to form the runner basin.

Instead of the more or less rough basin cut with a trowel, it is advisable to use a complete ring pattern, or a section of a ring. With a complete ring the entire basin is made up at one time. With a section, the pattern is moved around until the circle is complete. A passage 2 in. wide at the top, 1½ in. at the bottom and 6 in. deep will deliver metal to all the gates. Pouring ceases when the metal appears in the risers. This will empty the pouring basin. A dash of water will freeze the gates and then the risers are filled to the top with metal from a bull ladle, fresh and hot from the cupola spout. The top of each riser is covered with blacking and a shovelful of sand or one of the riser insulating materials and needs no further attention.

Causes of Pattern Plate Warp

Q.—In making aluminum pattern plates we place steel strips at the ends and side between cope and drag. After the casting is poured we turn the mold up on end and leave it there until the casting is cold. Despite this treatment the castings are warped. Do you know of any book, or article on the subject of warped castings? What is the cause, and more important how can warpage be prevented?

A.—We do not know of any book, but articles dealing with practically all phases of the warpage problem have been presented in The Foundry on many occasions. In a general way it may be said that the foundryman and the patternmaker have nothing to guide them but a species of sixth sense, instinct or intuition developed through many years of close observation and study. An experienced foundryman can look at a drawing or pattern and estimate pretty closely whether or not a casting will warp, to what extent and in what direction. We do not think there is a definite answer to the warping problem. Anything is possible, even though it may not be probable. This is illustrated by certain instances in which a casting warped in one direction one day, and in the opposite direction the following day.

The direct cause of warpage is the rate of speed at which various parts of the casting cool and contract. In some instances this is due to a combination of thick and thin sections. In other instances, where the section is uniform, it will warp if one side or one part is stripped before another side. Familiar examples are open sand plates and long grate bars molded on edge three or four in a flask. Unless the open sand plate is covered with sand, the upper face will cool first and the consequent contraction pull will cause the ends to spring up. If the drag flask is removed from the grate bars and the sand falls away from the outside, the two outer bars will spring outward at the ends. Precautionary measures to prevent warpage include use of chills, hard and soft ramming over certain parts, methods of gating, method of stripping and usually—the last resort—cambering of the pattern.

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MEN of Industry

ARTHUR S. KLOPF has been appointed works manager of the Western Foundry Co., Chicago, where he will have charge of the Chicago, Holland, Mich., and Morris, Ill., plants. Mr. Klopf, formerly senior engineer with Lester B. Knight & Associates, Inc., Chicago, began his industrial experience at the Worthington Pump & Machy. Corp., later being successively associated with the Allis-Chalmers Mfg. Co., Marquette University, Ross-Meehan Foundries Inc., Kearney & Trecker Corp. and the Hansell-Elcock Co., Chicago. Mr. Klopf was graduated from Marquette University with the degree of mechanical engineer, and from the University of Wisconsin with the degree of master of science in metallurgical engineering. He has been active in AFA circles for many years, being a past chairman director of the Chicago Chapter; secretary of the Committee on The Investigation of Casting Defects and a member of the AFA Committee on Refractories.

♦ ♦ ♦

Max Traum, newly elected president of the New Jersey Foundrymen's Association, is president of Sacks-Barlow Foundries Inc., Newark, N. J. He has been associated with the foundry industry for more than 25 years, all of that time with the Sacks-Barlow organization. He was made head of the company in June, 1944, previously having been vice president. Mr. Traum has long been active in foundry association work, including not only that of the New Jersey Foundrymen's Association, but also of the American Foundrymen's Association and the Malleable Founders' Society. He had been vice president of the New Jersey Foundrymen prior to his recent election.

♦ ♦ ♦

William E. Buckler has opened the Buckler Foundry Co. Inc., East Alton, Ill., where he will specialize in squeezer work of high quality gray iron and semi-steel castings. Mr. Buckler is a graduate mechanical engineer, receiving his education at University of Alabama and Alabama Polytechnic Institute. He gained his early training and experience with Central Foundry Co., Holt, Ala., and the U. S. Steel Corp.'s foundry, Fairfield, Ala., and at one time was dynamometer engineer, Stewart-Warner Co., Chicago. From 1928 to 1939 he was superintendent, John Deere Harvester Co., East Moline, Ill., and for the following 5 years was superintendent of the tractor foundry of Allis-Chalmers Mfg. Co., Milwaukee. For the last 2 years he has been general manager of war plants in Michigan and Alabama. A former professional football player, Mr. Buckler was with the Chicago Bears for 8 years, including the championship teams of 1932-33.

♦ ♦ ♦

John E. Anderson has been put in charge of a new district sales and service office opened recently in Indianapolis, by the Wheelco Instruments Co., Chicago which will serve the greater portion of Indiana, Western Ohio and Kentucky. **Walter A. Jones,** service engineer, will assist Mr. Anderson in Indianapolis. **L. A. Wallingford** has been appointed district manager of the Cincinnati office.

♦ ♦ ♦

George P. Torrence has been made president, Link-Belt Co., Chicago, succeeding **William C. Carter,** who has retired. Mr. Torrence, graduate of Purdue University, was with the company from 1911 to 1936, when he resigned as president. Subsequently he became vice president and general manager, Rayon Machinery Corp., subsidiary of Industrial Rayon Corp., and president, Cleveland Pneumatic Tool Co., both of Cleveland. He returned to Link-Belt Co. in July, as executive vice president. Mr. Carter continues as a director and as chairman of the executive committee of the board of directors and will act as consultant.

♦ ♦ ♦

A. C. Wooley, Wooley Instrument Service Co., Portland, Oreg., has been appointed Northwestern representative of Alloy Casting Co., Champaign, Ill., to handle the sale of stainless steel and heat resistant castings in that district. Mr. Wooley's staff of trained engineers offers a complete service in furnace engineering, metallurgy and instrumentation for the metal industries.

♦ ♦ ♦

Ernest Lancashire has been appointed general manager in charge of operations, Clark Castings Corp., Canton, O., a new organization which has acquired the old Canton Electric Steel Foundry Specialties Inc., that city. Until recently Mr. Lancashire had been chief metallurgist, Detroit Steel Castings Corp., Detroit. He received his metallurgical training at Sheffield University, Sheffield,

(*Continued on page* 118)

ARTHUR S. KLOPF

MAX TRAUM

WILLIAM E. BUCKLER

WE at Woodward take the opportunity of this approaching Christmas season to voice again our deep appreciation of the close relationships of many years past with our good friends in the foundry trade.

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(*Continued from page* 116)

England. Following affiliations with several English laboratories, he came to United States in 1923, and became associated with American Steel Foundries, Chicago, in the Granite City, Ill., and Alliance, O., plants. Later connections include Standard Brake Shoe & Foundry Co., Pine Bluff, Ark., and West Michigan Steel Foundry Co., Muskegon, Mich. Mr. Lancashire was instructor in heat treatment of metals and microscopic analysis of iron and steel, University of Illinois, for a time.

♦ ♦ ♦

James H. Smith has been appointed general manager of the expanded Central Foundry Division of General Motors Corp., with headquarters in Saginaw, Mich. Mr. Smith recently had been assistant to the vice president in charge of the Accessory Divisions Group in Detroit. The Central Foundry Division now includes Saginaw Malleable Iron Division, Saginaw, Mich., the Malleable Iron Foundry, Danville, Ill., the Lockport Gray Iron Foundry, Lockport, N. Y., and the proposed Gray Iron Foundry, Defiance, O. **S. W. Healy**, until recently in charge of the former Central Foundry Division, has been appointed assistant to Mr. Smith. **B. A. Dollens**, general manager of the Saginaw Malleable Iron Division, has been appointed assistant general manager of the Electro-Motive Division, LaGrange, Ill.

♦ ♦ ♦

Michael W. Gleisner, until recently associated with Slinger Foundry Co., Slinger, Wis., has been appointed works manager, Foundry Division, William E. Pratt Mfg. Co., Joliet, Ill. Mr. Gleisner entered the foundry industry in 1903, and served his apprenticeship in coremaking and molding under his father at the West Allis Malleable Iron & Chain Belt Co., now the Federal Malleable Co., West Allis, Wis. Subsequent connections include Chicago Malleable Castings Co., Chicago; Galesburg Malleaable Castings Co., Galesburg, Ill.; South Side Malleable Castings Co., and Stowel Mfg. Co., Milwaukee, and Walker Mfg. Co., Racine, Wis. From 1940-44 he acted as a foundry consultant, when he set up and placed in operation the Slinger Foundry Co.

♦ ♦ ♦

John S. Csaklos has been appointed works manager, Hartford Electric Steel Corp., Hartford, Conn., in charge of production and foundry operations. For the last 18 years Mr. Csaklos has been foundry superintendent, Reading Steel Casting Division, American Chain & Cable Co., at Reading, Pa. Prior to that he was plant superintendent, Sterling Steel Casting Co., East St. Louis, Ill., for 4 years, and plant superintendent, Sivyer Steel Casting Co., Milwaukee, for 6 years.

♦ ♦ ♦

John Madden, formerly general manager, jobbing division, James B. Clow & Sons, Chicago, has been elected vice president, marking the twenty-fifth anniversary of his association with the organization. He will continue to direct the jobbing activities. **Guy P. Clow**, manager of the company's Coshocton O., shop, and **G. Warren Whitney**, manager of the company's National Cast Iron Pipe Division, Birmingham, Ala., also were named vice presidents.

♦ ♦ ♦

Harry G. Uphouse has been appointed Eastern sales representative of Continental Foundry & Machine Co., Pittsburgh and East Chicago, Ind., with headquarters in Philadelphia where he will handle the sale of the company's industrial and miscellaneous steel castings.

♦ ♦ ♦

John A. Vanecho, recently released by the Navy with the rank of lieutenant (jg), has been named to the staff of Battelle Memorial Institute, Columbus, O., where he has been assigned to its division of research on high temperature alloys. Mr. Vanecho, a graduate of Ohio State University, was associated with the South Chicago plant, Carnegie-Illinois Steel Corp., Pittsburgh, prior to his military service.

♦ ♦ ♦

G. V. Leece, for the last two years vice president in charge of the export division, Gardner-Denver Co., Quincy, Ill., has been appointed general sales manager. Mr. Leece joined the company in 1922 and was district manager of the New York branch office for five years. Prior to that he was Pacific Coast manager. He is a director of the company and will have his new headquarters in the plant at Quincy.

♦ ♦ ♦

Herbert C. Geittmann has been appointed plant engineer, the Phosphor Bronze Smelting Co., Philadelphia. Mr. Geittmann, a graduate of University of Wisconsin, spent five years in Army Ordnance, and upon termination of his military service was special sales engineer for the Standard Steel Works Division, Baldwin Locomotive Works, at Chicago for a short time.

♦ ♦ ♦

Roland B. Fischer has joined the staff at Battelle Institute, Columbus, O., where he will be engaged in research in physical metallurgy. Mr. Fischer holds a degree in metallurgy from Colorado School of Mines. Prior to joining the Battelle staff he had been associated with American Smelting & Refining Co., El Paso, Tex., and previously had served as a lieutenant in the Army Corps of Engineers.

♦ ♦ ♦

E. J. Nist has been appointed assistant vice president, the American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill., with headquarters in the New York office of

(*Continued on page* 122)

JAMES H. SMITH

S. W. HEALY

B. A. DOLLENS

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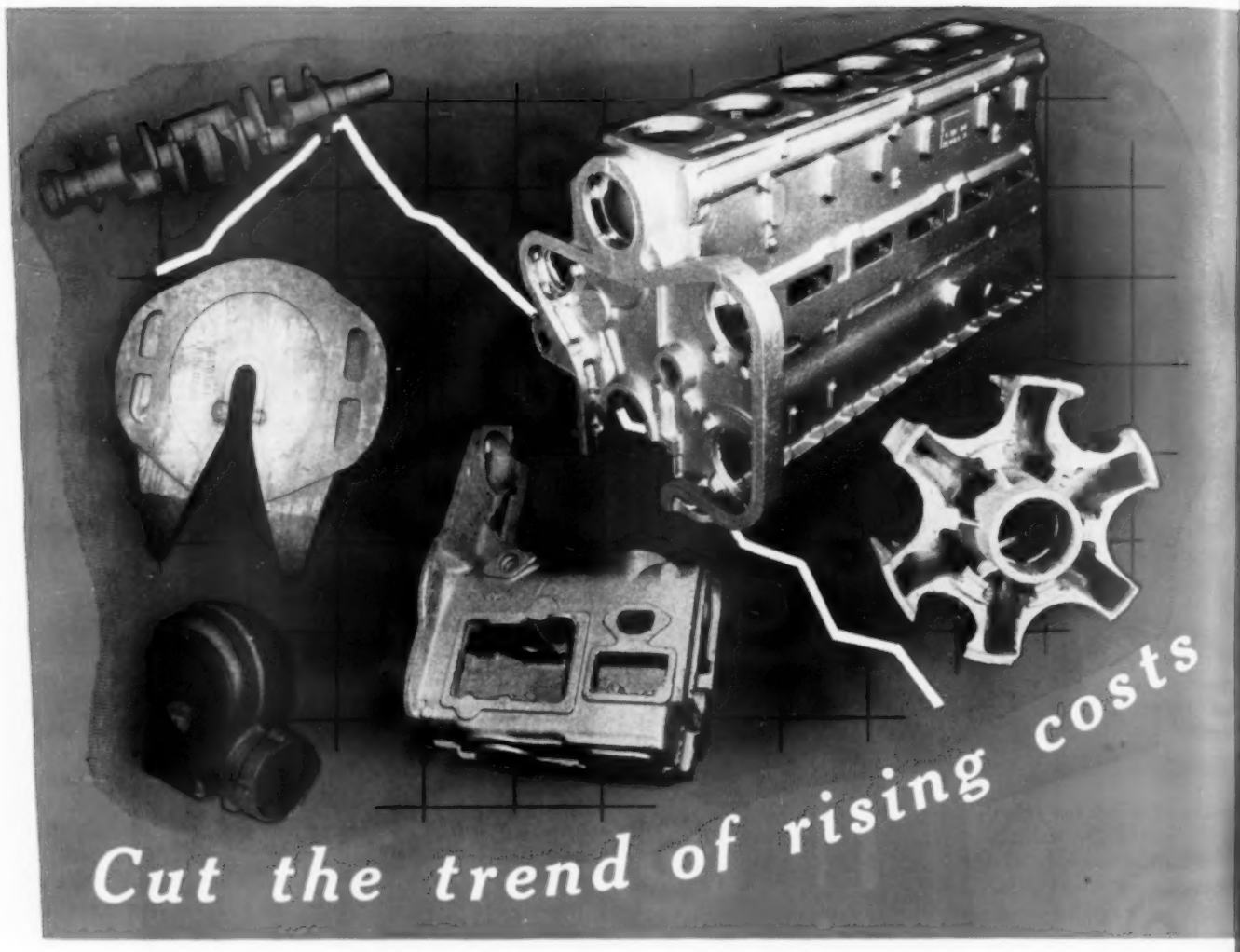

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With the average rate of production per man-hour now below pre-war levels progressive management today is thinking in terms of intensified mechanization to increase output, to lower unit costs, and to maintain profits.

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A good starting place is right in the cleaning room, because that is where the production speed and cost savings of the airless Wheelabrator have been so successfully applied by more than 3500 plants . . . a record that is unapproached in the airless blast field.

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COSTS REDUCED 66-2/3%

Hawkeye Steel Products Co., using a 48" x 42" Wheelabrator Tumblast, reports: "Our casting cleaning costs are only 1/3 of what they were in former years. This machine replaces three tumbling mills and the men it took to operate them."

SPARKPLUG TO EFFICIENCY

A Wheelabrator Plain Table installed at a large Cleveland jobbing foundry, to replace several old tumbling mills, is cleaning Meehanite castings so much faster and better that it has keyed up the entire cleaning department to higher efficiency. Daily savings of over $23.60 are being effected in cleaning costs alone.

ith Wheelabrators

$15,000 ANNUAL SAVING

Cleaning costs were reduced from $1.25 per ton to 62c at a Canadian Steel foundry with the installation of a 48" x 72" Wheelabrator Tumblast. With approximately 500 tons handled weekly this reduction amounts to more than $15,000 annually.

25% SAVING IN COSTS

A 66" Wheelabrator Swing Table at Ottumwa Iron Works, Ottumwa, Iowa, replaced a large tumbling barrel which was operated 24 hours a day and eliminated considerable hand cleaning of castings. Cleaning time has been reduced to 15 minutes per table load which represents a saving of 25% in cleaning costs over the previous method.

Cleaning a cast steel truck 'fifth' wheel on a No. 3 Wheelabrator Table at The Dayton Steel Foundry Co., Dayton, Ohio.

The H. P. Deuscher Co., Hamilton, Ohio, uses this 72" Wheelabrator Swing Table to clean miscellaneous gray iron castings.

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FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.

(*Continued from page* 118)

the company. **A. R. Sittig** has been named manager of manganese steel sales, and **E. L. Quinn** has been appointed vice president in charge of welding products, both with offices at Chicago Heights.

♦ ♦ ♦

J. T. Myers, for the last year assistant general manager, Davey Compressor Co., Kent, O., has been appointed vice president in charge of sales and production. A graduate of Duke University, Mr. Myers has been a member of the Davey organization for five years. He served aboard a mine sweeper during the war, and later was attached on special assignment to the Naval Engineering Laboratories, Annapolis.

♦ ♦ ♦

B. J. McGarry has joined Lester B. Knight & Associates, Chicago, as senior industrial engineer and will specialize in management and industrial engineering for foundries. Mr. McGarry was formerly president, Industrial Management Engineering Co., Cleveland. Prior to that he was associated with Industrial Methods Engineering Co., that city, and was president, the Arcy Corp., New York. **R. R. Deas Jr.** has been appointed survey engineer in foundry modernization programs for the Knight organization, with headquarters in Chicago. Mr. Deas has been associated with American Cast Iron Pipe Co., Birmingham, since 1914, beginning as an apprentice patternmaker, and subsequently working in the engineering, foundry office, laboratories, and melting departments. Later he became superintendent of the mono-cast shop, assistant to the vice president in charge of production and was appointed works manager early this year.

♦ ♦ ♦

Bruce Bevelheimer has been named assistant to the vice president, Furnace Engineers Inc., Pittsburgh. Mr. Bevelheimer, a fuel engineer, has been associated with the steel industry since 1924 when he joined the technical staff of Bethlehem Steel at the Sparrows Point, Md., plant. Since 1944 he has been associated with the Algoma Steel Corp., Sault Ste. Marie, Ont.

♦ ♦ ♦

John H. Cochrane, recently owner of the Cochrane Brass Foundry, York, Pa., has retired from the foundry industry following the sale of his business which he had operated since 1921 specializing in the manufacture of brass, bronze and aluminum castings ranging in weight up to 2000 lb. Mr. Cochrane began his foundry career in 1891 when he

JOHN H. COCHRANE

served part of his apprenticeship in a foundry in Hoosick Falls, N. Y., and completed his training at Troy, N. Y. He enrolled in various courses in foundry practice and worked in about 50 foundries, from New Jersey to Illinois, to broaden his experience. The York foundry will be continued by the new owners under the name Cochrane Brass Foundry Inc.

♦ ♦ ♦

Ned Landis, until recently a lieutenant commander, U. S. Navy, has been made branch manager of the Syracuse, N. Y., office, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Landis was associated with the Cincinnati office of the company prior to his five years of military service. He succeeds **Leonard R. Reid,** who is now in the electrical department at the company's plant in Milwaukee. Mr. Reid, a graduate of Cornell University, has been associated with the company since 1935.

♦ ♦ ♦

Fred E. Kurtz, metallurgist, Electric Steel Castings Co., Speedway City, Ind., has entered the service of the U. S. Army. **Dwight Mahin** will act as metallurgist in the absence of Mr. Kurtz.

♦ ♦ ♦

O. A. Tucker has been appointed vice president in charge of operations, Pacific Car & Foundry Co., Renton, Wash. For the last 14 months Mr. Tucker has been vice president and general manager, Everett Shipbuilding & Dry Dock Co., Everett, Wash.

♦ ♦ ♦

Dr. A. B. Kinzel, vice president, Union Carbide & Carbon Research Laboratories Inc., New York, has been elected chairman of the Engineering Foundation. Other officers include: **Dr. L. W. Chubb,** director of Westinghouse Research Laboratories, Pittsburgh, vice chairman; **Dr. Edwin H. Colpitts,** formerly vice president of Bell Telephone Laboratories, New York, director; and **John H. R. Arms,** secretary.

♦ ♦ ♦

American Foundry Equipment Co., Mishawaka, Ind., has announced several sales territorial changes and appointments: **Ardee H. Freeman,** district sales engineer in the Milwaukee territory, has returned to the Mishawaka office as special project engineer. Mr. Freeman joined the company in 1918 and has held a variety of positions in production, engineering and research. For the last 9 years he has worked out of the Mishawaka and Detroit offices as sales engineer, and when the Milwaukee office was opened last year he was assigned to

(*Concluded on page* 124)

J. T. MYERS

R. R. DEAS Jr.

BRUCE BEVELHEIMER

HANNIBAL'S FROZEN ASSET

The Romans smugly thought the icy barrier of the Alps impassable. But Hannibal turned the paralyzing cold to his advantage. He had water poured into the crevices of road-blocking boulders. The expansion of the freezing water "made little ones out of big ones"—and another road led to Rome.

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MOLY

(*Concluded from page* 122)

that territory. **James H. Thomson** succeeds Mr. Freeman in the Milwaukee territory. Mr. Thomson was sales engineer in the Mishawaka office prior to his new appointment. During the war he served as a lieutenant in the Navy. A graduate of Purdue University, he has worked for Youngstown Sheet & Tube Co., East Chicago, Ind., and for Clark Equipment Co., Buchanan, Mich. **Edwin P. Clarke** has been assigned to the Houston, Tex., sales office where he succeeds **Joseph F. Underway**, who has been transferred to St. Louis. A graduate of Miami University, Mr. Clarke joined American Foundry Equipment Co. following a 3-year association with the Mishawaka plant of U. S. Rubber Co., New York, as chief project engineer of the fuel cell division.

♦ ♦ ♦

Carroll M. Baumgardner, executive vice president, United States Radiator Corp., Detroit, was elected chairman of the executive committee, Institute of Boiler & Radiator Manufacturers, at the annual meeting held in Atlantic City, N. J. Mr. Baumgardner succeeded **A. E. Bastedo,** vice president and treasurer, Burnham Boiler Corp., Irvington, N. Y.

♦ ♦ ♦

J. H. Collin, formerly Cleveland branch manager in charge of sales of brass and bronze ingot, Federated Metals Division of the American Smelting & Refining Co., New York, has become associated with Benj. Harris & Co., Chicago Heights, Ill., in the same capacity. He has been engaged in sales work in the industry for more than 35 years.

♦ ♦ ♦

Dr. Edwin Gregory and **Brigadier Arthur Levesley** have been appointed directors, Edgar Allen Co. Ltd., Sheffield, England. Dr. Gregory has been chief metallurgist for the company for the last two years. Brigadier Levesley joined the company in 1910, and upon release from active duty with the British Army last year, he was appointed foundry manager.

♦ ♦ ♦

R. E. Thomas has been appointed purchasing agent, the Dumore Co., Racine, Wis., succeeding **G. K. Tollaksen** who has resigned to enter private business. Mr. Thomas has been chief accountant of the Dumore Co. for two years. Prior to that he was secretary-treasurer, Indianapolis Brass & Aluminum Foundry Inc., Indianapolis.

♦ ♦ ♦

C. W. Baker has been appointed assistant chief engineer of the Lewis Foundry & Machine Division, Blaw-Knox Co., Groveton, Pa., where he will specialize in the design of Lewis products. Mr. Baker has been on the engineering staff of Lewis Foundry & Machine since 1929.

♦ ♦ ♦

W. Herbert Everitt has been appointed sales representative in Washington, Oregon and British Columbia for Hydropress Inc., New York, builders of hydraulic presses, rolling mills and die casting machines. Mr. Everitt is a graduate of the University of Washington. His office is at 1743 First Ave. South, Seattle.

♦ ♦ ♦

W. A. Holtzman has been elected president and treasurer, Hart-Carter Co., Peoria, Ill. **P. E. Henseler** has been elected vice president and a director, and **S. E. Ross,** assistant secretary and assistant treasurer.

INVESTMENT CASTING: Twelve blades for aviation gas turbines can be cast in this flask at the precision-casting laboratory of Westinghouse Electric Corp., South Philadelphia. As shown here, wax patterns of the blade have been mounted on a wax base and covered with a suitable coating preparatory to being placed in a flask and surrounded by the investment material. After this material hardens, the wax is melted out and the mold is ready for pouring

Book Review

Heat Treatment of Carbon Steels, by F. Johnson, cloth, 204 pages, 5½ x 8½ inches, published by Chemical Publishing Co. Inc., Brooklyn 2, N. Y. Price $4.

The first of a series of four relating to mechanical and heat treatment of metals, this volume pertains only to carbon steels. Divided into seven chapters and an appendix, the first discusses the influence of composition and treatment on the structure and properties of carbon steel. Practical operation such as forging, various heat treatment procedures, etc., are described in chapter two while chapters three and four are devoted to hardenability. Chapter five pertains to mechanical properties including such phases as load, strain, stress, elasticity, plasticity, limit of proportionality, Hooke's law yield point, etc. Latter portion of the chapter deals with methods of testing, and the discussion is carried over to chapter six. Supplementary notes on the heat treatment of tool steel is the topic of chapter seven while the appendix presents information on a number of American and British standard specifications for steels.

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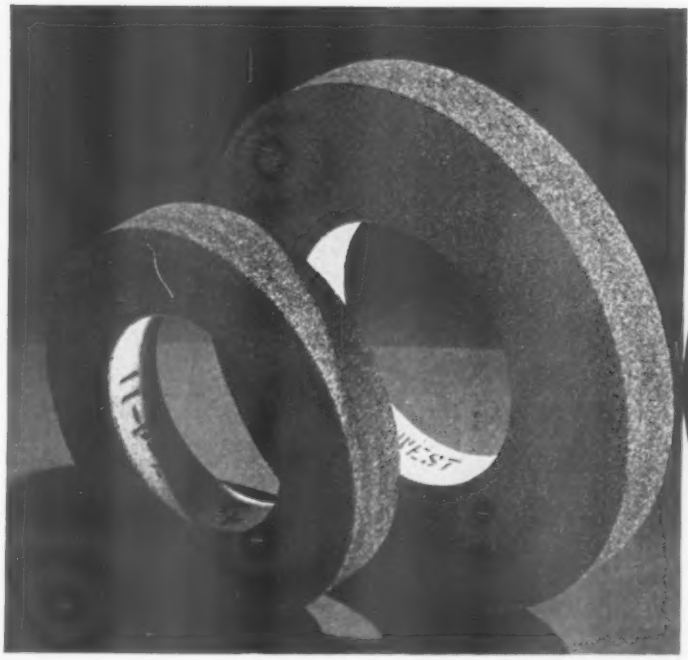

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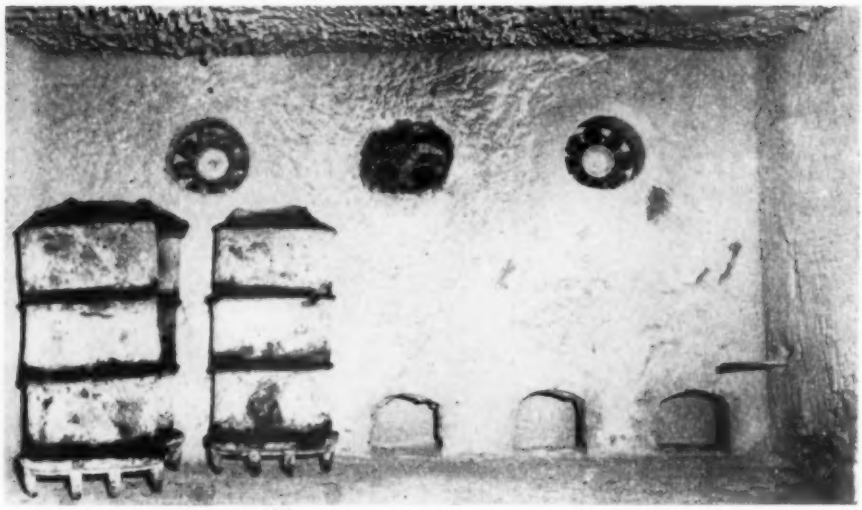


Interior of one of Canton Malleable Iron Co.'s new annealing ovens, showing circulating fan ducts near floor through which oven atmosphere returns to flue. Thermocouple is at extreme right, fuel jets in center of wall

By LOUIS BELDEN

CANTON Malleable Iron Co., Canton, O., has designed and built a battery of annealing ovens which are annealing white iron castings at a temperature of only 1600° F during the initial stage of graphitization in a 90-hour cycle. Marked economy in fuel consumption—pulverized coal is used—has resulted compared with previous practice.

Castings annealed in these ovens regularly conform to ASTM specification A-47-33, grade 35018, with carbons of 2.40 per cent and silicon of 1.05 per cent.

New features in the ovens include (1) a flue chamber within the oven which routes burning gases so as to maintain steady, even circulation throughout the oven; (2) fans which make circulation of gases in the oven complete and rapid, and (3) the use of removable water coils to accelerate cooling of gases and to decrease oxidation of pots and castings which would occur if outside air were introduced for cooling.

The flue chamber was created by erecting inside the suspended roof type oven a partition of insulating firebrick 13½ in. from the back wall. Two fans, set in the upper face of this flue wall, drive the oven atmosphere into the large combustion chamber. The gases pass evenly down, around and between the pots and enter the flue through ducts at the bottom. Once in the flue, the gases are drawn upward by the fans and again blown out into the oven to complete the circulation cycle.

Two 19-in. fans are used in each oven. Each fan is powered by a 1-hp motor bracketed to the exterior back wall of the oven. The blades turn at 1720 rpm on graphite water-cooled bearings. Each fan has an output of 5000 cfm.

The rapid and complete circulation of gases created by the fans reduces to 19 hours the time needed to raise the castings in all pots to 1600 F. Moreover, with the new ovens no difficulty is encountered in holding all the castings at a uniform temperature of 1600° for the 30 hours initial stage of graphitization and for the 23 hours taken to pass through the lower critical range.

Even more impressive are the time savings achieved in cooling the castings. At the end of the 1600° holding temperature, water coils mounted on wheels and counterbalanced are pushed manually through a small door into the flue chamber. The oven atmosphere, drawn between the coils, is quickly cooled without the disadvantage of introducing oxidizing atmosphere.

The temperature of castings regularly is reduced from 1600° to 1350° in nine hours. After passing through the lower critical range of 1350° to 1290°, the temperature is reduced to less than 1200° in three hours by means of the cooling coils. The doors are then opened, permitting the pots to be removed and the next charge placed in six hours.

The ovens, each of which handles approximately 25 tons of castings, were designed by Ralph N. Cole, president of the Canton Malleable Iron Co. Patents have been applied for covering certain unusual features of design and construction.

View from behind battery of ovens. At left is water coil in stand-by position before flue door of second oven. In foreground is heavily counterbalanced coil for third oven. Base plate to which coils are attached serves as door when coils are run into flue. One of fan motors is shown above

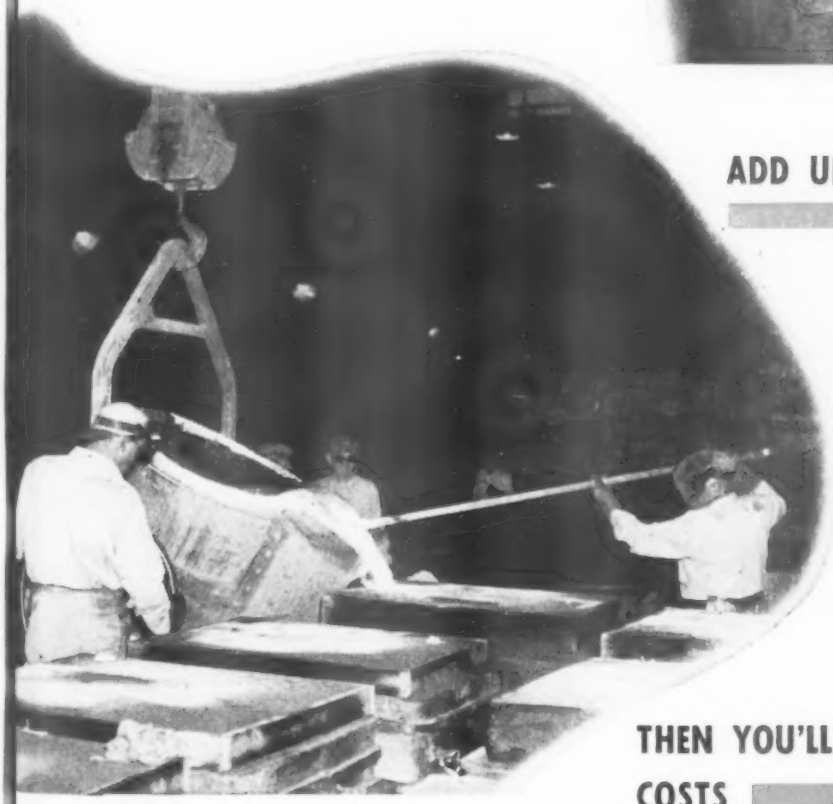
Offers Sling Chain Computer

A handy computer, designed to give hookers an accurate yardstick with which to determine the maximum safe load that a sling chain can lift at any given angle, is offered without charge by the S. G. Taylor Chain Co., Hammond, Ind.

In figuring the cost of X-rays

ADD UP THE TIME SAVED HERE . . .

In the machine shop: you can set it down as expensive machine time saved when you eliminate faulty castings before work starts. With x-ray you can do exactly that! You can locate defects in advance . . . decide for yourself which castings to reject, which to machine . . . save many times the cost of the radiographs.



ADD UP THE MONEY SAVED HERE . . .

In the foundry: there's a big cut in overhead when radiography is used. For it's quick and easy to determine the practicality of mold design . . . or the soundness of a foundry practice . . . merely by pouring pilot castings and x-raying them. You'll be able to make corrections swiftly, surely . . . more than pay for the x-rays out of the time and money you save.

THEN YOU'LL REALIZE HOW LITTLE RADIOGRAPHY COSTS

Add up these savings . . . the expensive machining time saved . . . the big cut in overhead on foundry operations. Then compare the savings radiography effects with what it costs. You'll see . . . clearly . . . that radiography more than pays its own way.

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Foundry Developments

By EDWIN BREMER

WHILE not a new development, a British foundry, in an endeavor to reduce lining wear in its cupola, tried the addition of coke dust to a ganister mix with excellent results. It was found for best results that the ganister should show the following typical sieve analysis: Retained on 8 mesh 3.4 per cent; 10 mesh 0.8 per cent; 16 mesh 3.2 per cent; 22 mesh 2.8 per cent; 30 mesh 5.0 per cent; 44 mesh 9.6 per cent; 60 mesh 15 per cent; 100 mesh 9.8 per cent; 150 mesh 5.8 per cent; 200 mesh 3.6 per cent; through 200 mesh 12.4 per cent, and clay 28.6 per cent. To the ganister 17½ per cent coke could be added with very good results. Moisture content was 7 per cent. In use all traces of slag and previous glaze are chipped off, the wall coated with a fireclay slurry, and the ganister-coke mixture rammed into place as hard as possible with a lead dresser. After the lining is completed it is given a light coating of fireclay to avoid coke burning out when the cupola bed is burning up.

• • •

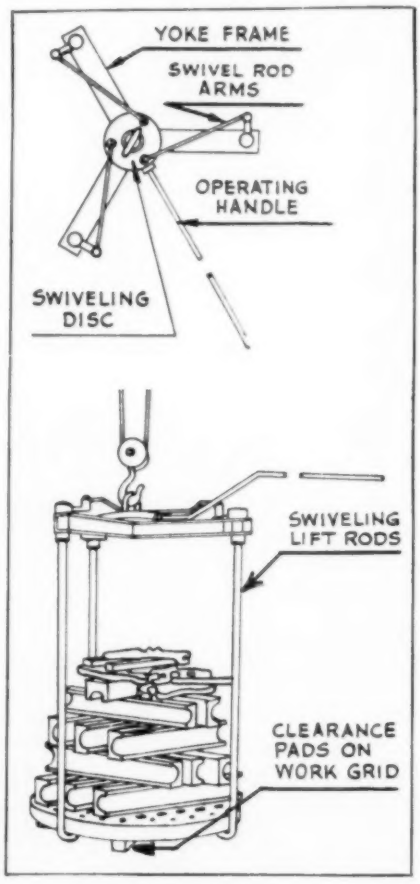
FORMULAS and tables presenting data on the relationship between brinell hardness number, tensile and yield strengths of wrought and cast steels are available in a report published by the Office of Technical Service, Department of Commerce, Washington 25. The data, compiled by Col. W. J. Crook in 1945 for use at Rock Island Arsenal, cover various conditions of tempering and heat treatment of wrought steels, SAE steels, NE steels and steel castings. Report is entitled "Relation Between Hardness and Tensile and Yield Strengths, Ferrous Materials;" PB-30814; photostat $1; microfilm $1.

• • •

WITH reference to yellow brasses *Recommended Practices for the Sand Casting of Nonferrous Alloys* published by AFA states that in general a pouring temperature of 2050 F is sufficient for most castings. Zinc distillation is heavy when the metal is overheated. If the alloys are poured into heavy castings at temperatures higher than 2050 F, the zinc will distill inside the mold and cause dirty castings. In the past phosphorus and aluminum were used to increase the fluidity. Phosphorus was added when wall sections were thin and the casting was required to resist pressure. Aluminum was added where no pressure requirements were involved and a smooth appearance was desired. Correct use of aluminum produces a pleasing appearance but the wrong application ruins the castings. Use of the proper amount of phosphorus aids in elimination of cold shuts. *Never use phosphorus and aluminum together in yellow brass.*

• • •

ACCORDING to *Heat Treating Hints* published by Lindberg Engineering Co., Chicago, a midwestern foundry recently built a novel "swivel fixture" to place loaded work grids in its pit-type production hardening furnace. It is said to make the heat treater's work easier, speeds heating and saves fuel. As shown in the accompanying illustrations, the fixture consists of a top yoke with a long handle which controls the revolution of three swivelling lift-rods that carry the loaded grid. Lower ends of the swivelling lift-rods are bent 90° to fit under and hold the grid and its load. The grid has clearance pads as indicated. After the loaded grid is placed in the furnace a turn of the handle disengages the rods, permitting removal of the yoke. Following heat treatment the reverse procedure is followed to remove grid and work from the furnace.



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CONTRARY to normal concepts of strength of materials, the strength of most bolts and nuts when used as clamping members is primarily a function of the tightness of the nut, according to a recent report, "Torquing of Nuts in Aircraft Engines," published by the Society of Automotive Engineers Inc. Report contains extensive data obtained from laboratory tests which were confirmed in actual service tests, and should be of considerable interest to design, production and maintenance engineers, metallurgists and all assemblers of mechanical equipment. Copies of the report may be secured from the society, 29 West 39th St., New York 18, for $4 to nonmembers and $2 to members.

• • •

APPLICATION of a flushing process developed by Air Reduction Sales Co. engineers, by which dry nitrogen or argon is bubbled through molten steel, eliminates dissolved hydrogen efficiently and at a reasonable cost, according to a recent announcement. Only equipment needed is a supply of dry nitrogen or argon and a special tube with which to introduce the gas in the form of small bubbles. It is anticipated that the new process will find wide use in foundries to minimize rejects caused by porosity.

• • •

FIRST ten of a series of "combustioneering" data sheets especially prepared for combustion and process engineers are available from the Industrial Division, Bryant Heater Co., 1020 London road, Cleveland 10. Mathematical tables, properties of gases, metals and other materials, and gas orifice capacity tables are included in the sheets, which are intended to bring together useful gas combustion and industrial heating data not readily available in a single source.

• • •

NEW gas producing equipment providing a neutral, CO_2-free, dry, burnt gas for heat treating medium and high carbon steels without decarburization has been developed by General Electric Co., Schenectady, N. Y. Basic unit is a complete and portable assembly mounted on a single base and interconnected with piping and wiring. It consists of a combined combustion chamber and reactivating tower, CO_2-absorbing tower, gas cooler, heat exchanger and liquid cooler. For drying the gas a refrigerated gas cooler and activated alumina dryer are supplied.

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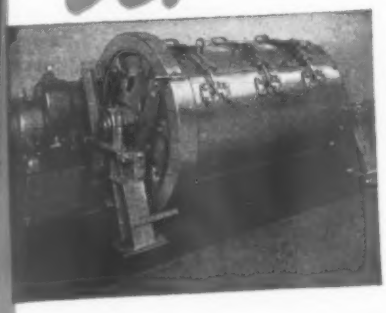


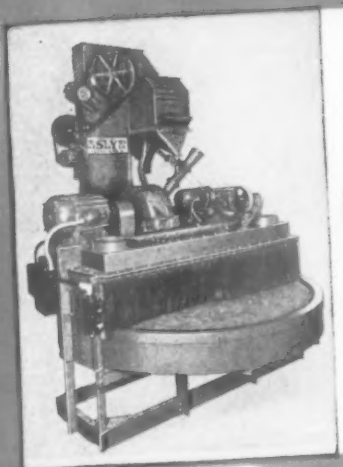
1. Heavy forged steel trunnions, extra heavy roller bearings.
2. Special door locks — easily operated.
3. Extra heavy gearhead motor.
4. Integral motor platform.
5. Loading and unloading from either side.

SLY BLAST CABINETS

1. Two lights mounted at front to illuminate castings.
2. Operator's eyes shielded by protective hood.
3. Easy loading and unloading of castings.
4. Used for thorough cleaning of small and intricate parts, or as an auxiliary to larger units.

SLY BLAST ROOMS

1. Overall down-draft ventilation.
2. Ample illumination.
3. Lined throughout with 3-16" wear plates.
4. Floor of grating and perforated plates.



SLY AIRLESS BLAST CLEANING EQUIPMENT

MILLS AND TABLES

Exclusive wheel features for fast and economical cleaning.

SLY DUST FILTERS

1. More filter cloth—hence greater filtering capacity.
2. Filter bags under tension (patented) insure: (a) minimum resistance to air flow, and (b) complete dust removal.
3. Simpler shaker mechanism—less moving parts, less maintenance.
4. Bags more easily replaced.
5. Automatic control — any degree.

SLY BLAST MILLS

1. Handles quantities of castings, forgings, stampings, hardened steel parts.
2. Tilted barrel with rolling action.
3. Convex perforated bottom plate forms bottom of barrel.
4. Work is constantly turned bringing bottom pieces to top.
5. Stationary head of barrel has large door for loading.

70 YEARS OF SERVICE TO THE FOUNDRY INDUSTRY

THE W. W. SLY MANUFACTURING CO.

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Around DETROIT

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

Slight easing in pig iron supply is hopeful sign but continued improvement not yet assured. . . . Lifting of price controls seen aiding restoration of normal flow of materials

SLIGHT easing in the critical pig iron supply situation has been encouraging news to foundries in this area, but whether it marks a trend which will show further steady improvement remains to be seen. Fingers generally are crossed. Never in the history of the automotive industry have melters been forced to the strenuous efforts of recent months to locate pig iron tonnages. Iron was shipped in from Utah, California, Mexico, England and even Norway at freight costs which were prohibitive, to say the very least. Iron from Utah, for example, carried a $15 per ton freight impost.

A peculiar angle about bringing pig from Norway, according to comment around here, is that that country also furnishes iron for foundries in France. Now the U. S. likewise has shipped iron to France to bolster the limping iron and steel industry there, so here you have a picture of U. S. iron going to France and Norwegian iron also moving to France and to the U. S. The waste of cross-hauling is apparent, but it is only one facet of a completely confused raw material situation the world over.

Any Port in a Storm

Little is said about the quality of pig iron being brought into the Detroit area from remote places, but some of it has been considerably "off" in analysis, particularly with respect to high silicon. As long as there is some iron in it, however, any complaints are subdued and attempts are made to make the best of the situation.

The normal pattern of coke movement to foundries similarly has been disrupted over the past year, leading to some grumbling on the score of coke quality. The average coke supplier just laughs when confronted with complaints on quality. His stock answer is: "Be glad you were able to get any at all."

There is a fair chance these materials problems will clear up appreciably by year-end. Passenger car and truck production is slowing a little, Ford having put through a 10 per cent cut, for example, and Chrysler previously having trimmed schedules by as much as 40 per cent. General Motors plants will be closing for varying lengths of time in connection with inventory-taking and changeovers to 1947 models. The combined effect should be to give suppliers a little breathing spell, permitting them to get caught up on shipping schedules. The lifting of price controls on all materials should have a further bolstering effect and lead to the restoration of normal flow of materials and supplies.

October output of cars and trucks set

a new high mark for the year at around 410,000 units, bringing 10-month production to better than 2,500,000. The last two months of the year should see another 600,000 produced, to make the yearly total in excess of 3,000,000. Stacked up against current demand, of course, this is not a particularly good record, but weighed against the problems involved it is exceptionally good. Prospects for 1947 seem to indicate a production of around 5,000,000 cars and trucks.

Even now some faint signs of a softening of demand are discernible. It is reported possible to get delivery of a new car from a couple of the independent producers in as little as two weeks, and there are scattered words of caution being expressed over the danger of pricing the industry out of its market. Certainly there are many complaints heard from buyers over high prices, most of them forgetting that the dollar today must be valued at only about 60 per cent of the 1939 dollar. Car prices average 40-50 per cent over what they were in 1939.

Possibility is seen that Kaiser-Frazer Corp. shortly may make some moves in the direction of acquiring its own foundry capacity. At present the company buys its gray iron castings from Wilson Foundry in Pontiac, but a recent staff acquisition at Willow Run is a well-known foundry engineer from the Birmingham, Ala., district, suggesting the likelihood of developing plans for an integrated gray iron foundry.

Assemblies at Willow Run are still some distance from the 1500 cars per day which was the projected figure when the plant was being organized. Supplies of flat-rolled steel recently were reported ample to support a rate of 1000 cars per day and the company has been bartering some of its steel for other supplies which are shorter. The ambitious production plans of Messrs. Kaiser and Frazer would infer the necessity for their own foundry, inasmuch as it is not likely castings could be purchased outside in sufficient volume to match planned car assemblies.

Arrange New Group

Reconstitution of General Motors' Central Foundry Division has been announced, principal feature being the integration of Saginaw Malleable Iron, the malleable iron foundry at Danville, Ill., the gray iron foundry at Lockport, N. Y.—formerly the Harrison Radiator Division foundry—and the proposed new gray iron foundry at Defiance, O. All will come under the direction of James H. Smith at Saginaw. At one time it was understood the Lockport facility was to be abandoned, but this may be deferred until the Defiance operation is functioning.

Generally speaking, General Motors has sharply trimmed its plant expansion activity in the face of difficulties in obtaining materials, both construction and production. On top of this the sharply higher costs involved in the program have resulted in its deceleration. Thus, the Chevrolet light car project at Cleveland has been suspended for a minimum of six months, which would mean next March before it would be reactivated. All work has been stopped on the $10 million technical center on the outskirts of Detroit. New assembly plants in the East have been held up temporarily.

As is the case with every other company, large or small, there is a limit to the amount of money which can justifiably be spent in modernization and expansion programs, particularly with a 50 per cent increase in cost of projected plans. In recent months, GM has bor-

(*Concluded on page* 132)

There IS a Great Difference in Roller Conveyer

WHEN you buy Roller Conveyer, keep in mind the service that you should expect from it. While two sections of different manufacture may appear to be of identical design, actually there is probably a vast difference in them. The gauge and quality of tubing used — the design of the bearings and the method of their lubrication. The size and style of axles, and the method of securing them in the frames. The construction and crossbracing of the frames. The couplings and supports. The weight and strength of the section. These are points which should be considered important. They quickly show that there is a difference in Roller Conveyer.

There is 40 years' experience behind Mathews Roller Conveyer. It is engineered to give long, efficient service, and each section is designed to meet specific customer requirements. We will gladly mail you complete data without obligation.

Mathews Conveyer Company
Ellwood City, Pennsylvania

(*Concluded from page 130*)

rowed $125 million on a long-term note from a group of insurance companies and more recently has filed with the SEC for issuance of 1,000,000 additional shares of preferred stock, indicating the inroads on working capital have been sufficient to propose need for additional financing.

Machine tool builders in this area report it is virtually impossible to locate capacity for small gray iron castings, resulting in cases of scores of new machines standing around waiting for two or three minor castings before they can be shipped. Foundry sources can be pardoned perhaps for preferring heavier work in which more tonnage is involved and in which more profit can be sighted, but the hardships worked on buyers of the smaller but vital castings have been numerous.

LISTS ASTM TECHNICAL

Committees and Officers

NUMEROUS committees of the American Society for Testing Materials develop standard and tentative specifications relating to ferrous and nonferrous castings as well as to some of the raw materials employed in their production. Since their activities should be of considerable interest to foundrymen, the following list of committees and officers is given to indicate those more specifically concerned with the foundry field:

COMMITTEE	CHAIRMAN	SECRETARY[1]
A-1 on Steel	N. L. Mochel, Westinghouse Electric Corp., Philadelphia.	
A-3 on Cast Iron	J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.	C. O. Burgess, Union Carbide and Carbon Research Laboratories Inc., Niagara Falls.
A-5 on Corrosion of Iron and Steel	*T. R. Galloway, Consolidated Edison Co. of New York Inc., New York.	
A-6 on Magnetic Properties	Thomas Spooner, Westinghouse Electric Corp., East Pittsburgh.	R. L. Sanford, National Bureau of Standards, Washington.
A-7 on Malleable-Iron Castings	*W. A. Kennedy, Grinnell Co., Inc., Providence, R. I.	H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland.
A-9 on Ferro-Alloys	I. H. Critchett, Union Carbide & Carbon Research Laboratories, Inc., New York.	A. P. Spooner, Bethlehem Steel Co. Inc., Bethlehem, Pa.
A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys	(To be elected)	
B-2 on Non-Ferrous Metals and Alloys	E. E. Thum, *Metal Progress*, Cleveland.	G. H. LeFevre, U. S. Smelting, Refining & Mining Co., New York.
B-3 on Corrosion of Non-Ferrous Metals and Alloys	H. S. Rawdon, Bethesda, Md.	A. W. Tracy, American Brass Co., Waterbury, Conn.
B-4 on Electrical Heating, Electrical-Resistance and Electric-Furnace Alloys	*J. W. Harsch, Leeds & Northrup Co., Philadelphia.	F. E. Bash, Driver-Harris Co., Harrison, N. J.
B-5 on Copper and Copper Alloys, Cast and Wrought	G. H. Hamden, General Electric Co., Schenectady, N. Y.	V. P. Weaver, American Brass Co., Waterbury, Conn.
B-6 on Die-Cast Metals and Alloys	J. R. Townsend, Bell Telephone Laboratories Inc., New York.	G. L. Werley, New Jersey Zinc Co. (of Pa.), Palmerton, Pa.
B-7 on Light Metal and Alloys, Cast and Wrought	*I. V. Williams, Bell Telephone Laboratories, Inc., New York.	J. J. Bowman, Aluminum Co. of America, Pittsburgh.
D-5 on Coal and Coke	A. C. Fieldner, U.S. Bureau of Mines, Washington.	W. A. Selvig, Pittsburgh, Pa.
E-1 Methods of Testing	W. H. Fulweiler, Philadelphia.	P. J. Smith, American Society for Testing Materials.
E-2 on Spectrographic Analysis	*B. F. Scribner, National Bureau of Standards, Washington.	Mary E. Warga, University of Pittsburgh, Pittsburgh.
E-3 on Chemical Analysis of Metals	G. E. F. Lundell, National Bureau of Standards, Washington.	J. W. Stillman, E. I. du Pont de Nemours and Co. Inc., Wilmington, Del.
E-4 on Metallography	L. L. Wyman, General Electric Co., Schenectady.	*Mary Norton, Watertown Arsenal, Watertown, Mass.
E-5 on Fire Tests of Materials and Construction	S. H. Ingberg, National Bureau of Standards, Washington.	H. M. Robinson, Underwriters' Laboratories, Inc., Chicago.
E-6 on Methods of Testing Building Constructions	*L. J. Markwardt, U. S. Forest Products Laboratory, Madison, Wis.	*J. H. Courtney, National Bureau of Standards, Washington.
E-7 on Radiographic Testing	H. H. Lester, Watertown Arsenal, Watertown, Mass.	*J. H. Bly, United Aircraft Corp., East Hartford, Conn.
E-8 on Nomenclature and Definitions	P. V. Faragher, Aluminum Co. of America, Pittsburgh.	R. E. Hess, American Society for Testing Materials.
E-9 on Fatigue	*R. E. Peterson, Westinghouse Electric Corp., East Pittsburgh.	*O. J. Horger, Timken Roller Bearing Co., Canton, O.
E-11 on Quality Control of Materials	*Harold F. Dodge, Bell Telephone Laboratories Inc., New York.	*O. P. Beckwith, Alexander Smith & Sons Carpet Co., Yonkers, N. Y.

[1]Pending election of a new secretary, R. J. Painter continues to handle these duties. *Newly elected.

Tells How To Handle Labor Grievances

Step by step procedures for handling employee grievances in both the small and large plant is the subject of a timely report, "The Practical Way to Handle Grievances," published by the Labor Relations Institute, 1776 Broadway, New York, and priced at $2.25. Sample employee attitude forms, an employee "gripe" form, a comprehensive list of "do's and don'ts" for employers in setting up a grievance system and a list of typical worker complaints apt to touch off stoppages and slowdowns are contained in the report. Specific contract clauses, tested in the experience of many firms, are included in the suggestions made to employers for the drawing up of contracts with unions.

Equipment Company Changes Name

Name of the 38-year old American Foundry Equipment Co., Mishawaka, Ind., has been changed to American Wheelabrator & Equipment Corp. According to Otto A. Pfaff, president, the new name is more appropriate because one of the principal products of the company is its Wheelabrator cleaning and finishing unit.

Book Review

What Industry Owes to Chemical Science, cloth, 372 pages, 5½ x 8½ inches, published by Chemical Publishing Co. Inc., Brooklyn 2, N. Y. Price $5.

This volume, prepared under the auspices of the Royal Institute of Chemistry (London), is the outcome of an earlier work to supply the answer to the question "What is the place of the chemist in practical life and what part has he taken in industrial and social development?" Present edition contains the contributions of some 50 authors in 18 different fields, and is written for the general reader as well as chemical students. The authors have handled their works extremely well, and by avoiding technical details have made an easily understandable and interesting compilation.

Fields discussed include agriculture, food, water supplies and sanitation; pharmaceutical products, soaps, waxes and glycerin, disinfectants, antiseptics and preservatives, technical and other chemicals, dyestuffs, textiles, pulp and paper, synthetics and plastics, india rubber, photography, coal and its products, heavy chemicals, minerals and metals, building materials, and transport.

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HEAVY-DUTY
MOLDING MACHINES
Jolt .. Squeeze and Pattern Draw

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The international acceptance of large numbers of NICHOLLS Molding Machines for many years is evidence of their productive capacity combined with low upkeep and reliability. NICHOLLS design and construction is the basis of this reputation.

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Pistons and Cylinders are finished ground to micrometer sizes. All draw pins and guide bushings are case hardened and ground to precision tolerances for perfect fit and smooth operation.

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Shown with Parallel Self-Positioning Squeeze Head

AUTOMATIC CONTROLS

These machines can be equipped with Push Button Control for all operations, including jolt and squeeze timing.

ALIGNMENT

The one piece heavy base and cylinder castings with integral supports for uprights, guide pins, bushings and valve brackets assures rigidity and permanent alignment.

LOW UPKEEP

For satisfactory performance over extended periods, dirt proof housings and forced lubrication have been provided for all parts that might otherwise wear quickly; thereby assuring low upkeep costs.

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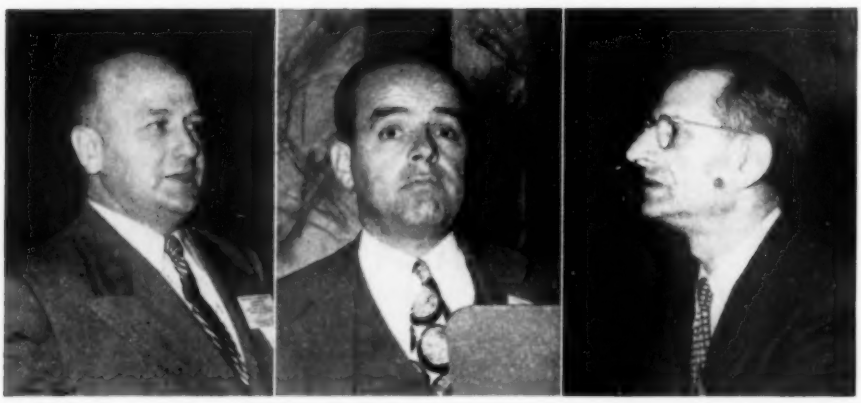
NICHOLLS

PHILADELPHIA CONFERENCE

Draws 500 Eastern Foundrymen



Members of the general committee in charge of the recent Regional Foundrymen's Conference at Philadelphia. Left to right: B. A. Miller, committee chairman and chairman of the Philadelphia Chapter; H. L. Ullrich, chairman, Metropolitan New York Chapter; David Tamor, chairman, Chesapeake Chapter

A WELL diversified program of excellent technical papers was largely responsible for success of the Regional Foundrymen's Conference held under the sponsorship of the Metropolitan New York, Philadelphia and Chesapeake Chapters of the AFA at Town Hall, Philadelphia, Nov. 1-2. The two-day program, which included one general session and six technical sessions —the latter made up of two gatherings by each of the steel, gray and malleable iron and nonferrous groups—attracted a registration of approximately 500.

The committee in charge of arranging the program was headed by C. L. Lane, Florence Pipe Foundry & Machine Co., Florence, N. J., other members being E. C. Troy, Dodge Steel Co., Philadelphia, H. A. Deane, American Brake Shoe Co., New York, and Dr. Blake M. Loring,

By WILLIAM G. GUDE
Managing Editor
and BEN K. PRICE
New York Editor

Naval Research Laboratory, Washington.

At the opening general session B. A. Miller, Baldwin Locomotive Works, Philadelphia, chairman of both the Philadelphia Chapter and the general committee for the conference, welcomed the audience and presented William W. Maloney, national AFA secretary, who introduced the principal speaker, Frank G. Steinebach, editor, THE FOUNDRY Discussing "Progress in Castings," Mr. Steinebach traced the wartime experience of the foundry industry in expanding production for military purposes, and cited the numerous developments which occurred in foundry practice and casting metallurgy during the period.

Speaking of lessons that foundrymen should have learned during the war, Mr. Steinebach stated that it is apparent the fortunes of one branch of the industry are closely interwoven with the success of all other branches, consequently the future success of the entire industry demands the co-operative efforts of all types of foundries. In this connection he recommended the creation of an overall organization that will correlate the efforts of the different groups and will represent the entire industry when such occasion demands. Other requisites to future progress he cited included research, increased attention to good housekeeping and plant modernization, better customer relations, improved cost control, more uniformity of product and the interesting of young men in foundry careers.

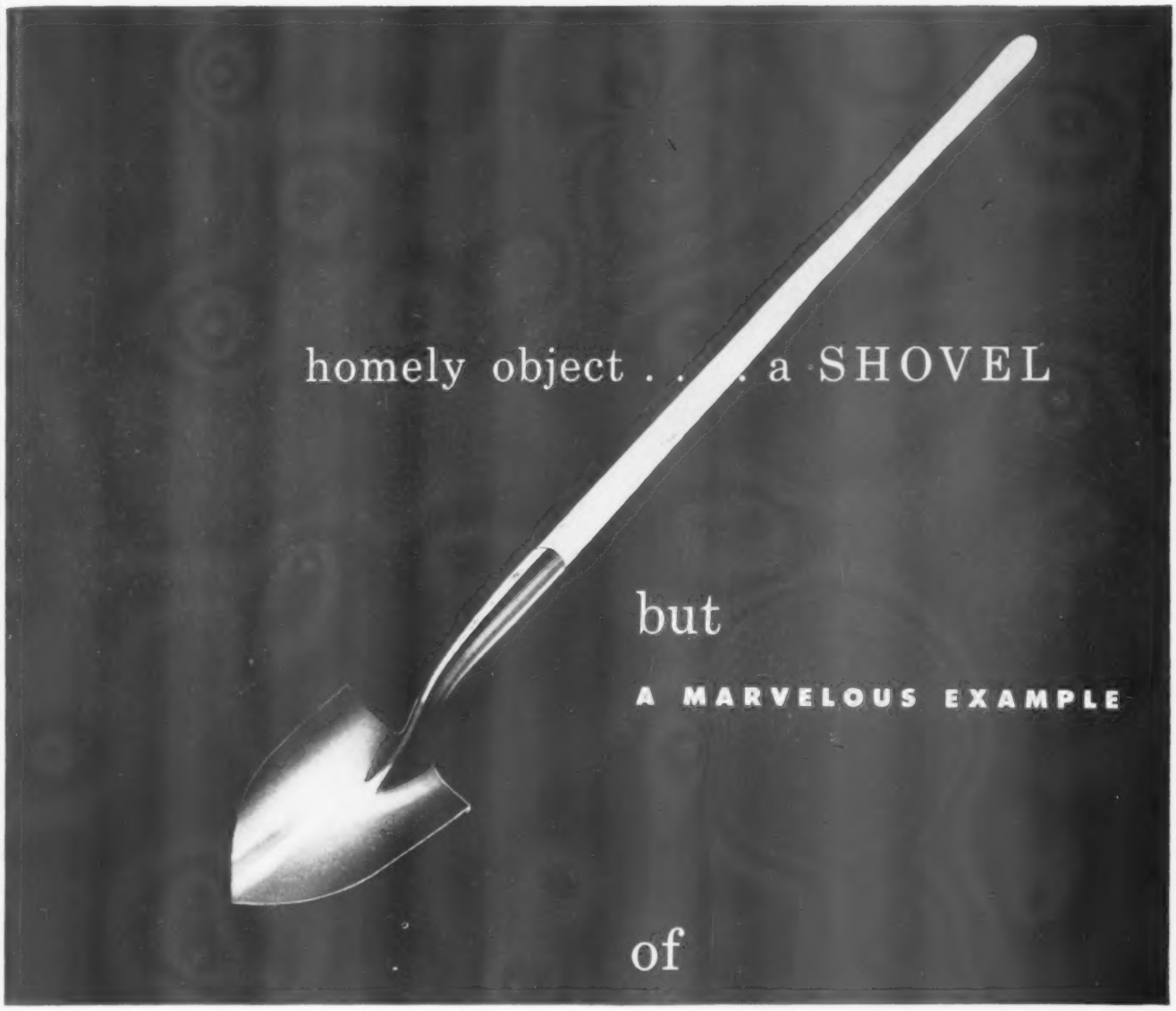
At the first gray and malleable iron session, W. G. Reichert, president, W. G. Reichert Engineering Co., Newark, N. J., urged foundrymen to make careful surveys of various departments in their respective plants to see what could be done in the economical mechanization of their operations. He suggested however, that they first see what they could do toward improving their practice with what equipment they have before buying more; in other words, develop operations as efficiently as possible first.

He was confident that most foundries would find that they could install some additional equipment to good advantage. He warned however, against too elaborate equipment.

Proper mechanization, the speaker de-

(*Continued on page* 137)

Luncheon gathering of some of the 500 participants in the foundry conference at Philadelphia, Nov. 1-2



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IMPROVED UP-TO-THE-MINUTE MOLDING MACHINES FOR EVERY NEED

Some of the speakers at the Philadelphia Regional Conference. Left to right: Karl Wheeler Jr., T. E. Egan, Henry C. Winte, Cecil E. Bales, Charles B. Schureman and Frank G. Steinebach

(*Continued from page* 134)

clared, results in better controls, better help and a better finished product. Amortization of cost for new equipment should fall within a period of not more than two years if the improvement is to be truly economical.

The basic problem in casting and pattern design is how to produce most economically a final finished part which will satisfactorily serve required purpose, James M. Lansing, consulting engineer, Malleable Founders' Society, Cleveland, declared. This involves the following major considerations: Adequate strength and toughness and rapid and economical production in the foundry and in the machine and finishing departments.

The speaker outlined some of the principles which both the engineer and the foundryman must take into account. In this he spoke with particular regard to malleable, although indicating that the principles for the most part had general application to other types of castings as well. He declared (1) that the thickness of casting section should preferably be as near uniform as possible, avoiding abrupt changes of section; (2) that if changes to heavy section are required, ribs of sufficient thickness to facilitate feeding may be placed on the light section so as to connect with, and feed into a heavy section or base; and (3) that provision should be made of a suitable section for gating and feeding.

Mr. Lansing also pointed out that (4) ample fillets should be provided; (5) that plates should be kept in tension and ribs in compression; (6) that sufficient pattern draft should be allowed; and (7) that cores should be eliminated when possible.

H. T. Ullrich, superintendent, Sacks-Barlow Foundries Inc., Newark, N. J., presided at this talk.

Discussing modern foundry refractories, C. E. Bales, vice president, Ironton Fire Brick Co., Ironton, O., outlined developments in the manufacture of cupola blocks and described what he believed to be the best refractories suitable for lining the various sections of cupolas and other foundry melting units. He discussed also the installation of refractories and what procedure to follow with respect to making repairs. He commented at some length on ladle linings and urged that care should be taken in seeing that scrap used in the furnaces is of proper size—neither too large nor too small.

W. W. Levi, metallurgist, Lynchburg Foundry Co., Radford, Va., presided.

The first of three subjects discussed presented at the final gray and malleable iron session was on "Molding Materials," with Charles B. Schureman, F. E. Schundler & Co., Joliet, Ill., the speaker and R. J. Allen, Worthington Pump & Machinery Corp., Harrison, N. J., the chairman. Mr. Schureman listed various circumstances in sand selection and preparation which can cause trouble. When synthetic sand mixes are employed the base sand and bonding material should be adapted to the type of casting being produced. Components of the mix should be measured carefully with accurate containers or other devices, and the mixing operation should be supervised by a responsible individual, he stated.

The second speaker, Henry C. Winte, works metallurgist, Worthington Pump & Machinery Corp., Buffalo, had for his subject "Gates and Risers for Sound Castings." George Hadzima, superintendent, Robbins Conveyors Inc., Passaic, N. J., was chairman. Mr. Winte pointed out that the major difficulty with most riser designs is that the riser contains cold metal which is not capable of feeding back into the casting section which is shrinking. An effective cure for this is to gate through the riser, a method incorporated in the shrink bob riser design. Examples were cited of shrink bob riser applications and of correct proportions of the riser. The speaker stated that it is extremely important that the drag bob extend sufficiently below the riser neck to insure molten metal in that section of the riser directly opposite the neck. One of the principal failings of gating systems utilizing the principle of gating through the riser is the absence of sufficient depth of drag bob to provide relationship between the liquid metal in the riser and the liquid metal in the casting.

The concluding paper, "Casting Defects—Their Causes and Corrections," by W. B. McFerrin, Electro Metallurgical Co., Detroit, was an exhaustive review of the subject and included some unpublished data accumulated by the AFA

(*Continued on page* 140)

Additional speakers shown left to right: J. E. Crown, William Morley, J. A. Wettergreen, Dr. Blake M. Loring, John Howe Hall, A. L. Wentzel and James H. Lansing

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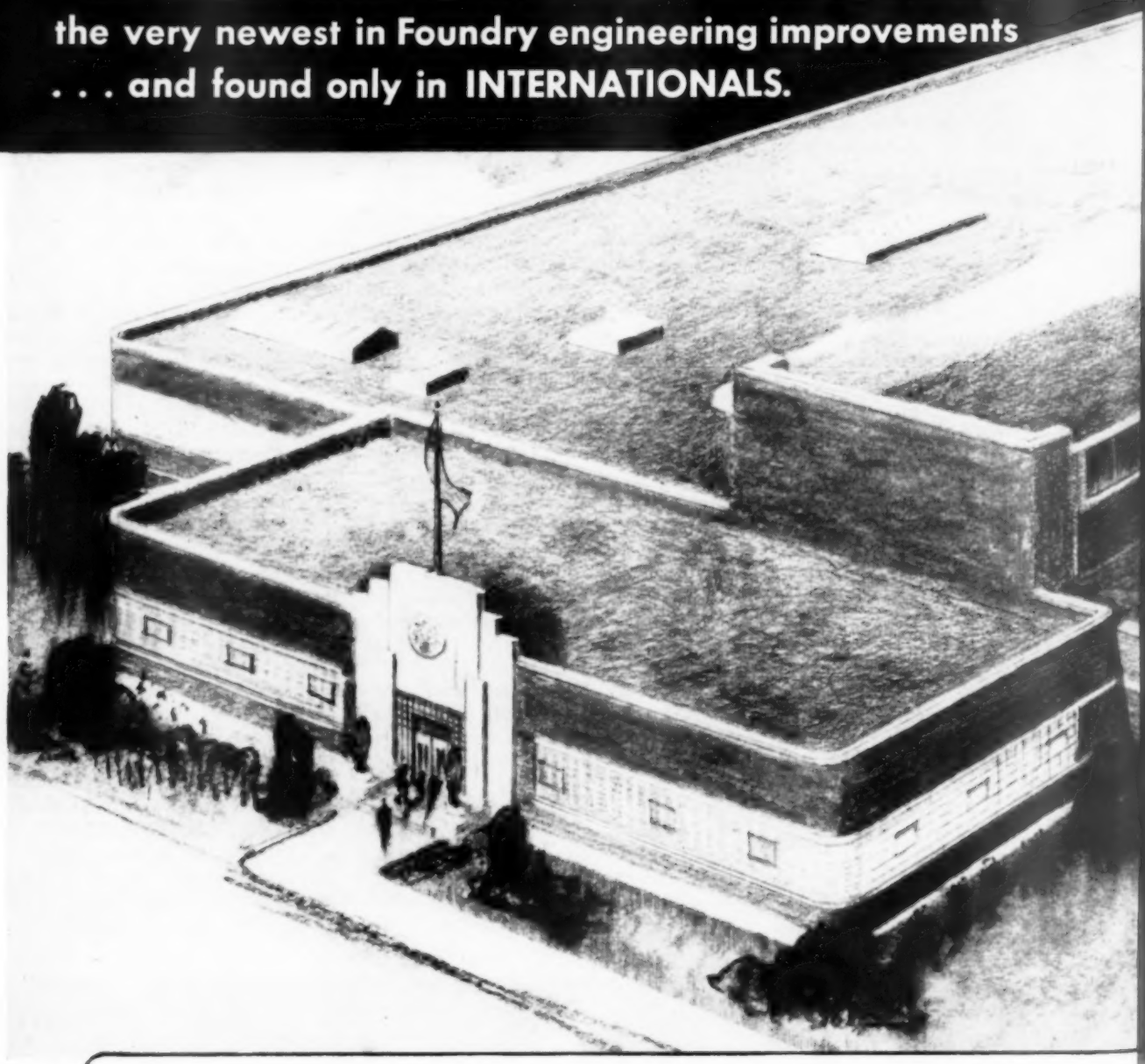

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Other conference speakers, left to right: H. L. Smith, William W. Maloney, William B. McFerrin, Clyde L. Frear, Stanley W. Brinson, C. A. Robeck and William G. Reichert

(*Continued from page* 137)

Committee on Analysis of Casting Defects, of which Mr. McFerrin has been a member for the past six years. The speaker listed 18 basic casting defects which are common to both gray and malleable iron castings and 11 factors in foundry operations which may be responsible for one or more of these defects. Individual influence of these various factors was described in detail, and slides were shown to illustrate the types of defects outlined.

• • •

Three papers were presented at the opening session devoted to brass, bronze and light metals. "Synthetic Sand in the Nonferrous Foundry," by Stanley W. Brinson, U. S. Naval Shipyard, Norfolk, Va., comprised a detailed description of practice at the speaker's foundry in preparation of synthetic molding sand and core sand mixtures. Clyde L. Frear, Bureau of Ships, Washington, acted as chairman. Base sands used by the Norfolk foundry for nonferrous castings are of 55-70, 90-100 and 140-160 AFA grain fineness. Sand, clay and cereal binders are tested carefully for various properties.

Synthetic sand mixes are used as a facing ½ to 1½ in. thick. This facing subsequently is reclaimed and used as backing sand. Two regular and five special mixes now are used for nonferrous purposes, and Mr. Brinson listed the composition, physical properties and uses of these mixes. An improvement he cited in use of mold and core washes consists of packaging the wash mixes in quart and gallon containers which facilitates the accurate mixing of the wash and prevents waste.

The second paper, "Pressure Tightness of Bronze Castings," was presented by Dr. Blake M. Loring, Naval Research Laboratory, Washington, with David Tamor, American Chain & Cable Co., York, Pa., serving as chairman. Dr. Loring showed numerous slides to illustrate some results of a study of alloys, part of which program is related to pressure tightness. Influence of lead in improving tightness was described. Hot tears were mentioned as having the greatest influence in causing lack of pressure tightness, with shrinkage the next most important factor. The speaker recommended use of clean dry scrap and careful deoxidation of the metal in the melting process.

Concluding this session, R. E. Ward, Eclipse Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., discussed "Comparative Foundry Characteristics of Various Aluminum Alloys." Earl J. Bush, U. S. Naval Gun Factory, Washington, presided. Mr. Ward described various casting defects in discussing the properties of the principal copper-aluminum and silicon-aluminum alloys. Hot tears, which occur before solidification is complete, result from nonuniform solidification, with large grain size a factor. Readily collapsible cores are required to prevent hot cracking. Alloys containing silicon are more susceptible to gas absorption than the copper-aluminum alloys.

Commenting on melting and furnace problems in brass and bronze foundries at the concluding session on nonferrous metals, H. L. Smith, Federated Metals Division, American Smelting & Refining Co., made three general recommendations:

(1) Adjust burners on gas or oil-fired furnaces and the oxygen output in electric arc furnaces until the furnace atmosphere shows no carbon monoxide, about 0.50 to 2 per cent oxygen, and as high a carbon dioxide value as is possible. With induction furnaces, he continued, reduce the turbulence to a minimum and add the charge to the crucible in increments during the melting cycle rather than fill the crucible with the entire charge; then proceed with melting.

(2) Maintain temperature and pouring speed constant at all times and see that all avenues of feed to the casting proper are kept completely full during the entire pouring cycle. Never try to vary the speed at which molten metal enters the casting proper by manually trying to vary the pouring speed.

If these two fundamental recommendations are carefully followed, he said, any difficulties which may arise can then be corrected by (3) a proper placement of gates, risers, chills, etc. In this way the foundry will deal with only this one variable rather than try to control three variables, which must be the case when endeavoring to correct difficulties by changing combustion, temperature, pouring speed, along with changes in design —to say nothing of further changes in condition of sand.

While basically the same as in the

(*Continued on page* 142)

Speakers shown left to right: Douglas J. Taylor, George Hadzima, H. E. Cragin, Robert E. Ward, Phillip DeHuff, Walter W. Edens and Wally W. Levi

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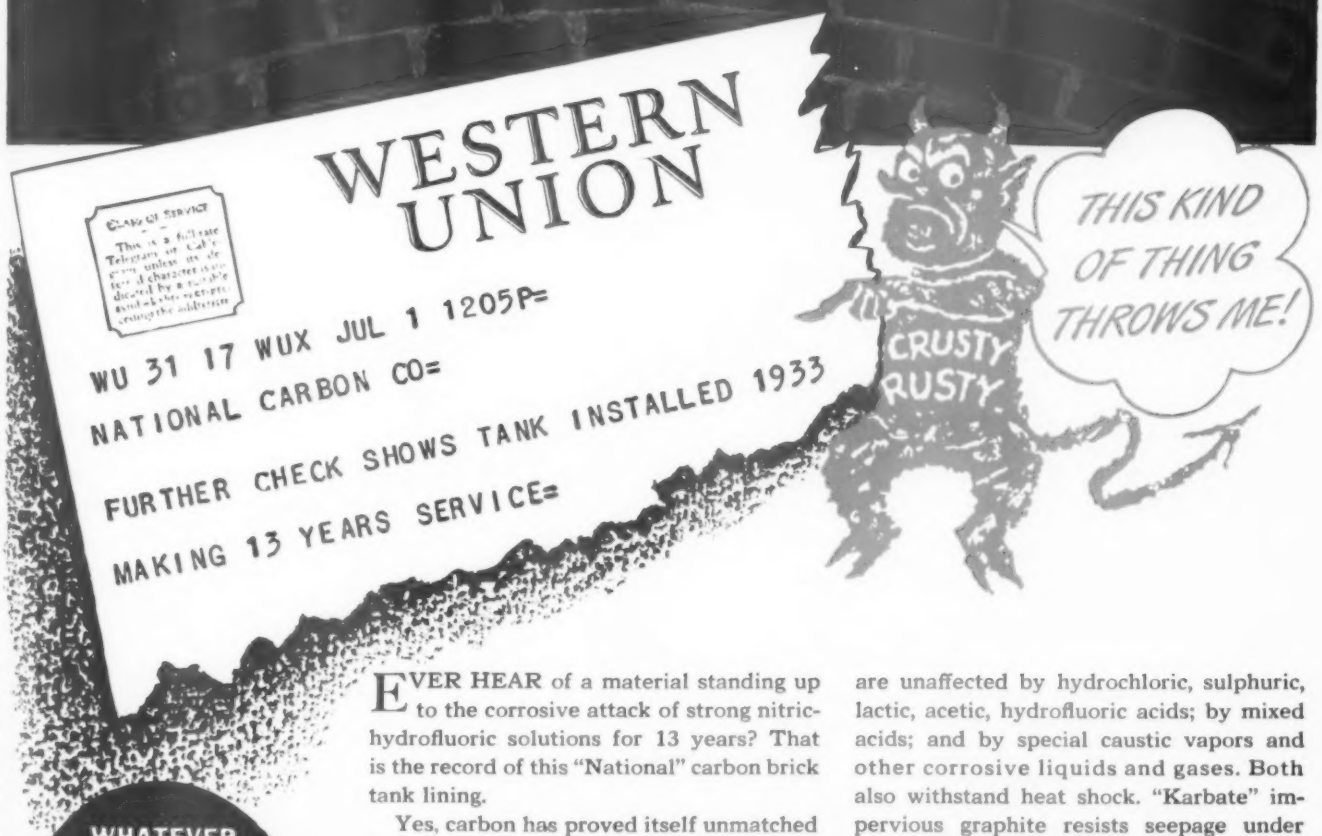
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MAN-TO-MAN
on the Molder's Bench

"Foundry 'Yes' Men"

By RALPH L. LEE

IN ONE way my foundry hobby is getting to be sort of a joke around our house, for my son accuses me of going clear around Robin Hood's barn to make something out of a casting that might better be made some other way. His mother backs him up by insinuating that if she doesn't watch me I'll be trying to cut the lawn in the foundry. However, I'm not very sensitive about the kidding so I go merrily on my way, trying new stunts, making mistakes, some good castings and having a darned good time doing it.

News of all this must get around, for not over a week or two ago a sculptor from the art department of a college near by asked me to make a bronze casting of a battleship he had modeled in clay. Well, I took one look at the model, shuddered and told him that the job was way over my head. While I admit that having read about Benvenuto Cellini and a flock of articles on the lost wax process, I would have liked to look over the shoulder of someone who knew how to do a job like that. But as for me, when I showed the sculptor the kind of castings I had been making, he readily agreed with me and we parted friends.

When I told about this experience to an old timer in the foundry business, he surprised me by saying that he knew any number of foundries that would be a whole lot better off if they did what I had just done, turn down a job that was over their heads. He went on to say that a lot of foundry red ink was spilled in purchasing agents' offices every day by foundrymen who didn't know how to say no.

To this I said that, as far as I could see from my recent visits to foundries, most of them were so loaded up with orders they should be in a position to turn down just about any job they didn't like. My friend agreed that it probably did look like that to an amateur but he guessed that there must be a gambling streak—in some foundrymen at least—that caused them, even in times like these, to take on jobs they weren't equipped or able to handle in the hope that with luck they would be able to muddle through somehow.

I was glad to take his word for it as I didn't have very much experience, but just the same it seemed to me that in any up and coming business you had to take a flier every once in awhile at a job you didn't quite know how to handle. Later on I learned from my experienced friend that he didn't mean a person shouldn't try hard jobs or new ways of doing old jobs but is was buying pigs in the poke that caused foundry people and their customers so much trouble.

I could see that he had a point, as I knew from what I'd heard that a lot of scrap, both in the foundry and the shop, could be traced to taking on jobs without F.B.I.'ing them first. On the other hand, maybe we don't reach out far enough in the foundry business, and are inclined to wait for others to tell us what can and what cannot be made in castings, almost as though a patient told his doctor what kind of pills he should prescribe.

Maybe I'm getting in clear over my head here, but in spite of it, the way the family is kidding me on trying to make everything out of castings, and the trouble foundries get into by biting off more than they can chew, I still think there is one whale of a lot of things being made of stampings, forgings and weldings that could be made out of castings better and cheaper if the right person looked around for them and figured out a way to do it.

While this line of thinking may seem a bit out of order with so many foundries loaded with work, something tells me that after we get caught up we are going to find on top of the competitive heap some courageous souls who didn't know a lot of things weren't being done, or couldn't be done, and went right on ahead and did them.

By the way, after writing this article I called up the sculptor from the college and told him that while I hadn't changed my mind about his battleship, if he had some simpler statue, I might take a crack at it. I found he was having one heck of a time trying to get his stuff cast so we made a deal. I sort of figured that even my little foundry wasn't too small to do a bit of business development, even while business was good.

(*Continued from page* 140)

red and yellow metals, melting practices in special alloys obviously involve special problems, W. W. Edens, Ampco Metal Co., Milwaukee, declared, in the second paper at this session. He agreed heartily with the conclusions made by Mr. Smith on the red and yellow brasses, and then went on to emphasize certain problems in working with close analysis metals.

He stressed the necessity for good housekeeping, the importance of knowing precisely what raw materials are entering the melt and of having them all properly segregated and identified. Special care should be taken in the segregation of back scrap and in keeping the crucibles and furnaces clean and free from contaminating elements.

While special alloys can be produced in a variety of furnaces, he thought crucibles or similar type melting units were best suited for the purpose. He emphasized the importance of maintaining as high a wall temperature in furnaces as the refractories will permit, in order to

(*Concluded on page* 144)

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(*Concluded from page 142*)

insure fast melting.

Mr. Edens spoke of the need for close temperature control, and suggested that gating be arranged so that the metal can be poured at the lowest possible temperature. Melting, he added, should also be done at the lowest possible temperatures.

He did not favor the use of special deoxidizers if they can be avoided, preferring instead to rely on the elements in the mix for this purpose. He suggested the standardization of melting practice to the point where it runs the same each time.

J. E. Crown, U. S. Naval Gun factory, Washington, presided during the first part of the session and Clausen A. Robeck, Gibson & Kirk Co., Baltimore, during the second part.

• • •

The opening steel session under the chairmanship of John Howe Hall, foundry consultant, Swarthmore, Pa. featured discussions of both manufacturing and application problems. H. F. Cragin Jr., plant superintendent, Taylor-Wharton Iron and Steel Company, High Bridge, N. J., in a paper "Steel Castings for Naval Use" discussed numerous interesting factors affecting the foundry industry which he observed during his tour of duty as an officer in the Navy assigned to the Welding, Castings, and Forging Section of the Bureau of Ships.

Mr. Cragin indicated that co-operation among the foundries was best when the going was toughest. However, in an earnest desire to participate to the fullest in the war effort, many foundries scheduled more orders than they could produce. In the speaker's opinion, efforts of the War Production Board to apply priorities, CMP and other schemes were relatively ineffective because of the lack of an efficient production scheduling system in foundries.

In addition to repair ships, land based repair activities were established upon islands throughout the Pacific. The foundries at these bases initially were designed for the production of gray iron and nonferrous castings. However, as the war progressed, the need for steel castings developed at these bases as well as from the repair ships, and the necessary development work was undertaken to permit the production of steel.

In the second paper, D. G. Taylor, field engineer, Bethlehem Steel Co., Bethlehem, Pa., considered "Factors Influencing the Design of Sand for Heavy Duty Castings." Mr. Taylor said that greater progress in foundry problems could be attained if all fields of available ceramic science were utilized, since the technical aspects of sand problems are largely ceramic.

A sand must act as a mild chill. If the sand does not chill the metal, and the metal is free to do so, it will penetrate the surface of the mold. Often in the case in heavy work, the sand first acts as a chill, setting up a thin skin of solid or viscous metal. When the heat-absorbing power of the sand is reached, the metal becomes more fluid and penetration results. For this reason, a high heat capacity sand sometimes is desired.

Mr. Taylor stated that spalling, one of the most important factors in brick design, has been given little consideration in the design of foundry sands. It is the cause of numerous casting defects, such as penetration, scabs, cope drops and others.

In the final paper of the session, Phillip DeHuff, metallurgist, Westinghouse Electric Corp., Lester, Pa., discussed "Progress in Precision Casting." Mr. DeHuff said that the term "precision casting" is a misnomer and that the type of casting being described should be called an "investment casting." He indicated that the industry has made considerable progress in filling the vacancy which had existed in sources of this type of casting. In his opinion the future field of such castings will range up to 5 lb in weight.

Cites List of Advantages

The following advantages were listed; 1. Obtaining fine detail and fairly good accuracy; 2. Producing very thin sections; 3. Casting alloy for high temperature use where other methods of forming cannot be used; 4. Producing contours that cannot be machined; 5. Eliminating most machine operations; 6. Low tooling cost; 7. Preparing castings for certain design studies which would be too expensive by other methods. As to disadvantages, Mr. DeHuff gave the following: 1. Only small castings can be produced; 2. Inaccuracies in pattern influence castings greatly; 3. Can have same defects as provided by other methods of casting.

Considerable discussion was provoked by the two papers presented at the concluding steel session, at which A. L. Wentzel, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., was chairman and James A. Gillis, Bethlehem Steel Co., Steelton, Pa., was co-chairman. Describing difficulties in effective use of the Washburn riser in producing small cast valve bodies of stainless steel, Karl Wheeler Jr., production superintendent, American Steel Castings Co., Newark, N. J., displayed samples of the castings in which shrinkage occurred in the flanges under the risers.

The speaker offered one explanatory theory that an oxide film forms around the core in the blind riser upon contact with the metal, thereby preventing atmospheric pressure from assisting in the subsequent feeding of the casting and causing the eventual shrinkage. This is particularly true of small castings, which require early feeding, he said. Some improvement in the condition resulted from redesigning the core to incorporate sharp edges, the use of more oil in the sand mix and the insertion of the core deeper into the riser.

One suggestion was that the trouble resulted from gas developed from the core which is less able to escape from small castings than from large ones. Another was that a higher pouring temperature be employed and that the core be made sufficiently small in relation to the riser size to prevent the chilling action which seems to shut off the effects of atmospheric pressure.

"Problems in the Production of Turbine Castings," a paper given by J. A. Wettergreen, superintendent of foundry, General Electric Co., Schenectady, N. Y., included a number of interesting slides illustrating gating and risering practice in the production of these large castings weighing up to 60,000 lb. As explained by the speaker, the combination of light and heavy sections in turbine parts creates numerous problems for the foundry; feeding requires the proper temperature gradients, while the cored design complicates cleaning operations. While the chipping hammer, shot blast and flame cutting are employed mostly in cleaning castings, Mr. Wettergreen predicted more extensive use in the future of chemical treatment for removing sand and scale.

• • •

Thursday evening preceding the conference a management meeting was held at the Bellevue-Stratford, attended by approximately 150 foundry executives from the Metropolitan New York, Philadelphia and Chesapeake Chapter areas. Brief talks were given by W. W. Maloney, who outlined activities of the American Foundrymen's Association, and by Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., and national AFA vice president. Principal speaker was William B. Given Jr., president, American Locomotive Co., New York, who traced the developments in foundry working conditions and management-labor relations over the past 40 years. "We have done too little talking about management faults and management shortcomings in labor relations, over the years," he stated. "Currently, we are too much on the defensive against labor difficulties. The time is here for us to set about to re-win the confidence of our people. Acceptance of the fundamental that in large part recent troubles have come out of past management blindness will help us more capably make the future."

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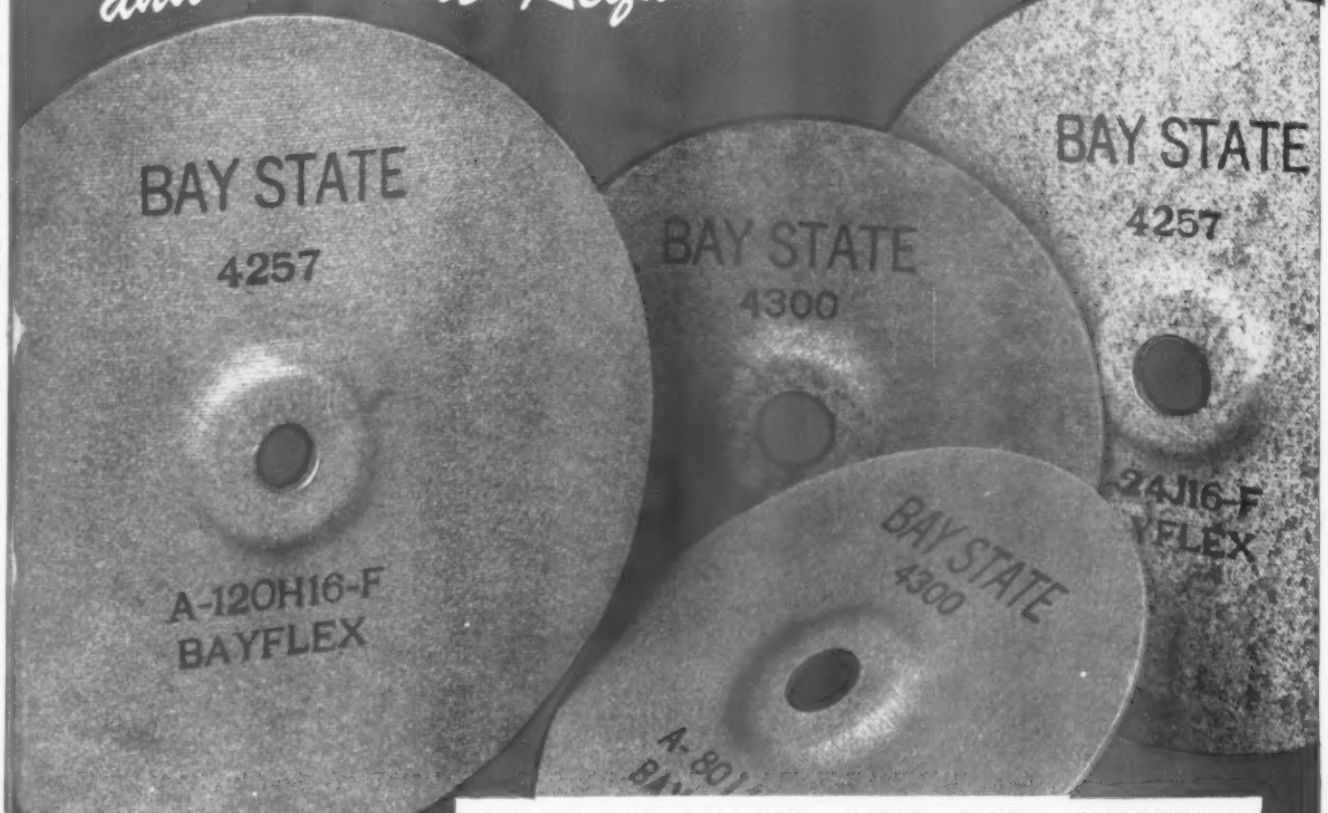

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Nonferrous Cost System

THIS Expanded Cost System, developed by the Cost Committee of the Non-Ferrous Founders' Society, follows the basic principles of the Simplified Cost System compiled in 1945 and presented in the February and March, 1946, issues of THE FOUNDRY. However, the new system goes into more detail on items of expense.

This breakdown of detail can be carried on to any desired degree, conditioned only by the size of operations and the specific cost information wanted by the operator.

For instance, in the Simplified Cost System, the item of "General Labor" combines all indirect labor in the foundry. In the Expanded Cost System this labor is charged to the proper department and appears in the cost as parts of the breakdown for that particular department. This also applies to supplies and many other items of expense and labor which are carried in larger foundries or which have increased to the extent that every effort should be made to charge them to the proper department.

When the first draft of the Expanded Cost System was completed in February, 1946, a copy was forwarded to each member of the society and to a great many non-members for comment and criticism. All constructive criticisms have been incorporated here with the sincere hope that the system will meet the requirements of most members of the industry and that it will offer enough flexibility to permit the variations that may exist in different foundries and different methods of sound cost accounting.

Members of the Cost Committee of the Non-Ferrous Founders' Society include: L. M. Nesselbush, Falcon Bronze Co., Youngstown, O., chairman; A. M. Cadman, A. W. Cadman Mfg. Co., Pittsburgh, and W. A. Gluntz, Gluntz Brass & Aluminum Foundry Co., Cleveland.

METAL COST: This is broken down into Metal Purchase Price, Burden and Shrinkage.

Metal Price—Purchasing price (scrap metal virgin metal, ingot metal)

Burden—

Class 1: Any freight charges on the above purchases.

Class 2: Handling expense and preparation of scrap.

Class 3: Inventory labor expense.

Class 4: Laboratory expense.

Class 5: Credit to metals due to salvage from skimmings and grindings.

Metal Loss or Shrinkage—(Based on good castings shipped). This is a percentage from skimmings and grindings. No attempt has been made to go into question of what the melting loss or shrinkage should be. This will vary, depending on the type of alloy in question. It will also vary for different classes of furnace or melting operations as well as for large or small castings. This figure will have to be developed by the individual, based on his own practice and experience.

In determining the foregoing metal cost consider 85-5-5-5 ingot, purchase price for which is 13c per lb in 20,000 lb lots. This is the delivered price, involving no freight charge. But the metal must be handled and stored and, during the course of the year, there is a certain inventory expense. There may be a laboratory charge for checking analysis. Certainly there is a melting loss or shrinkage. Therefore, the metal cost is more than the 13c purchasing price, the extent depending on the costs of these various other items.

MELTING EXPENSE: This is broken down into nine subdivisions:

No. 1. Labor (including direct melting supervision).

No. 2 Fuel (oil, gas, coke, electricity—plus freight on fuel).

No. 3. Crucibles (melting pots, furnace linings, patch material, etc.).

No 4. Furnace maintenance labor (on furnaces and furnace equipment).

No. 5. Supplies (skimmers, fluxes, miscellaneous tools, furnace tongs, pyrometers and pyrometer maintenance, etc.).

No. 6. Laboratory expense (melting control).

No. 7. Power necessary to operate.

No. 8. Share of operating overhead expense.

No. 9. Share of fixed overhead expense.

Note: A survey indicates that most foundries prefer to base their melting cost per pound on the tonnage of good castings shipped. However, melting cost per pound may also be based on total metal melted if this fits better into a foundry's individual costing methods.

A certain amount of judgment must be displayed in use of the estimating sheet when different alloys or different types of castings are run together in a plant. For example, much more metal will be melted in the case of manganese bronze than in the case of red bronze. Therefore, melting expense will be proportionately higher.

MOLDING:

Class 1. Bench Molders (prime direct

Class 1-A. Floor Molding or Side Floor Molding.

a. Prime journeyman molders or prime apprentice molders producing molds independent of prime journeyman molders.

b. Auxiliary helpers, or auxliary apprentices helping prime journeyman molders.

Class 1-B. Machine Molders.

a. Prime machine operators.

b. Auxiliary helpers, or auxiliary aplabor chargeable against the prime machine operator.

Class 2. Any special supplies or equipment directly chargeable to an individual job.

Class 3. Molding Burden.

1. Prime labor hours used in remaking defective castings.

2. Indirect labor (preparing molding sand, transporting sand, carrying flasks, pouring, shakeout, etc.).

3. Supplies (sand, gaggers, tools, shovels, facing, riddle, nails, etc.).

4. Heat, light and power.

5. Maintenance and repair labor.

6. Share of operating overhead expense.

7. Share of fixed overhead expense.

The burden rate is arrived at by dividing prime labor hours into total burden expense. This is a burden rate per prime molder hour.

NOTE: In this setup, "prime" means the actual man doing the molding, as distinguished from the "auxiliary" man who might help the molder. In all cases the auxiliary helper or auxiliary apprentice, when used on the job, is a direct labor charge against the job. His hours of labor are not in the burden rate nor are they totaled in the prime labor hours to arrive at the burden rate that applies to the molder. The same distinction is made between "prime" and "auxiliary" workers in the following setup for coremakers.

COREMAKING:

Class 1. Bench Coremakers prime direct labor.

Class 1-A. Floor Coremaking or Side Floor Coremaking.

a. Prime journeyman coremakers or prime apprentice coremakers producing cores independent of prime journeyman coremakers.

b. Auxiliary helpers, or auxiliary apprentices helping prime journeyman coremakers.

Class 1-B. Machine Coremakers.

a. Prime machine operators.

(*Continued on page* 149)

A small percentage added to your mix will:

- Supply proper green bond to sharp sand
- Give smooth performance in core boxes
- Reduce core and cleaning costs
- Bring out fine detail

SHOWN above is an unretouched photograph of a number of malleable cores made with Krause Cereal Binder where collapsibility is important. Notice the accurate detail . . . the smoothness of surface . . . the sharp, unbroken edges. Figure it out for yourself what it would mean in your foundry to have such cores . . . to have them easier . . . at lower cost . . . with fewer rejects. Truscor and Amerikor are made to the most exacting standards. The result is a combination of unvarying quality, greater binding strength in the green and dry core stages, increased permeability, less sticking, easier ramming—and increased production of better cores. On your next order for cereal binder, specify Truscor or Amerikor. Phone, wire or write outlining your core problem in detail.

CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wis. · ***World's Largest Millers of Dry Corn***

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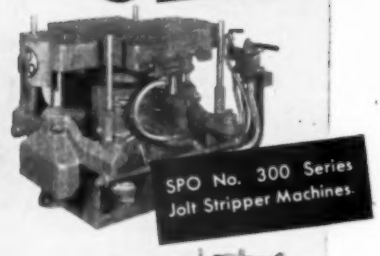
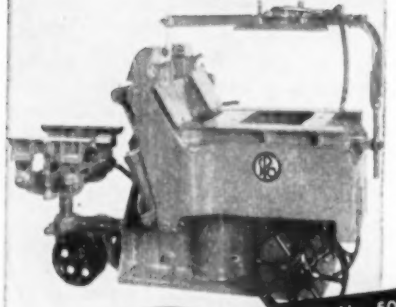
SPO SPECIALIZES, TOO!

SPO No. 100 Series Jolt Squeezer Machines, CANTILEVER Type.

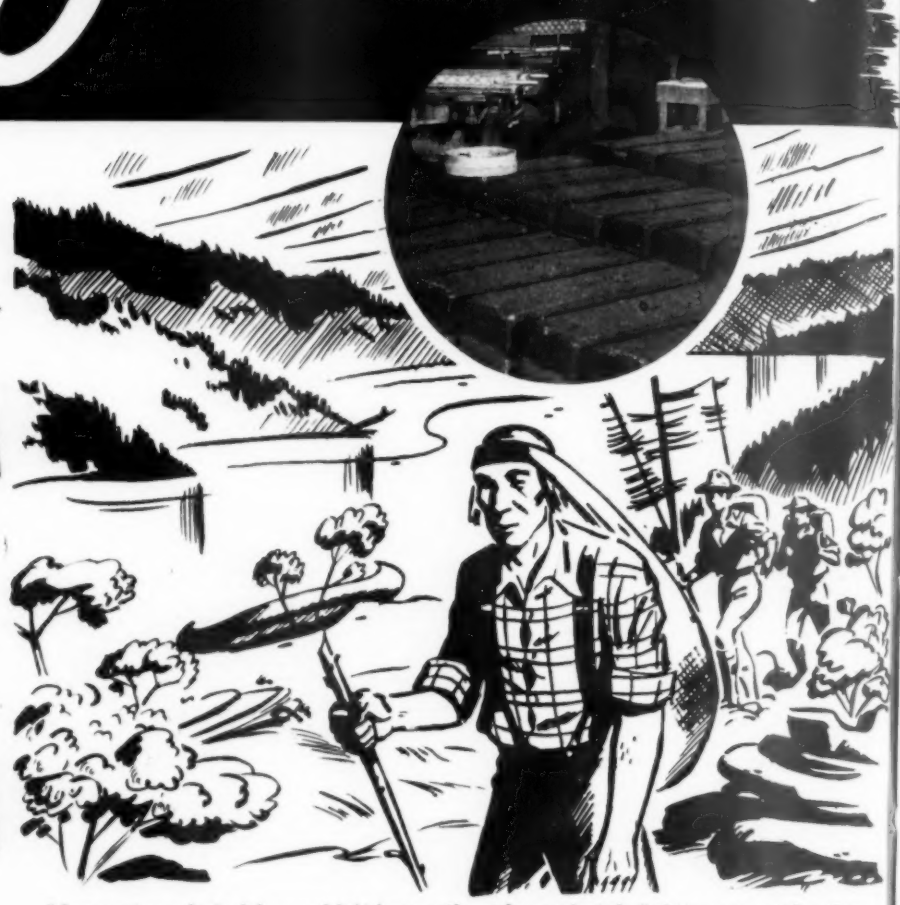
SPO No. 200 Series Jolt Squeeze Stripper Machines, CANTILEVER Type.



SPO No. 300 Series Jolt Stripper Machines.



SPO No. 500 Series Jolt Rockover Draw Machines.



Many a traveler's life wouldn't be worth a plugged nickel if it were not for the thorough knowledge of a tried-and-proven guide . . . That is specialization.

★ ★ ★

Simplicity of design is a great deal more than an idle phrase. Actually, it is the basis for many important advantages in industrial equipment, particularly molding machines. For example, it promotes: 1. fast operation—more molds; 2. accuracy—molds true to pattern; 3. versatility—many kinds of work; 4. compactness—less floor space; 5. easy "get-at-ability"; 6. little maintenance and 7. more continuous production.

"Samples" of four SPO series are shown here. They illustrate a soundness of design and construction that runs through the entire line. "As simple as a paper knife"—that's the general idea. And that simplicity has been furthered by SPO year after year through specializing in this important phase of molding machine design and construction.

MEMBER

MANUFACTURERS' ASSOCIATION INC. FOUNDRY EQUIPMENT

Ask for Bulletins on any SPO series

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO

(*Continued from page* 146)

b. Auxiliary helpers or other direct labor chargeable against the prime machine operator.

Class 2. Any special supplies or equipment directly chargeable to an individual job.

Class 3. Core Burden.

1. Prime labor hours used making cores replacing defective cores or castings.

2. Indirect labor (preparing core sand, transporting sand).

3. Supplies (sand, tools, shovels, riddles, nails, etc.).

4. Light, heat and power.

5. Fuel (oil, gas, charcoal, electric).

6. Maintenance and repair labor.

7. Share of operating overhead expense.

8. Share of fixed overhead expense.

The burden rate is arrived at by dividing prime labor hours into total burden expense. This is a burden rate per prime coremaker hour.

CLEANING COSTS:

Class 1. Direct Labor (any time that can be directly chargeable to the individual jobs—cutting off gates, removing risers, knocking out cores, grinding or filing).

Class 2. Burden.

1. Prime labor hours used in cleaning, replacing defective castings.

2. All indirect labor (foremen, clerks, hauling castings, carrying gates and risers —anything that cannot be chargeable to an individual job).

3. Supplies (sand blast, shot or sand, band saws, hack saws, files).

4. Labor for repairs to equipment.

5. Fuel and power.

6. Share of operating overhead expense.

7. Share of fixed overhead expense.

To arrive at the burden here, the total of the direct labor hours divided into the total burden expense, gives a burden per direct hour of labor.

INSPECTION AND SHIPPING:

1. Labor (All labor used in the shipping and inspection departments transporting of castings, truck drivers, etc.).

2. Supplies (cartons, paper, tools, etc.).

3. Heat and power.

4. Share of operating overhead expense.

5. Share of fixed overhead expense.

The total expense divided by the total castings shipped gives an average cost per pound. In this department, this average price is felt to be more accurate than a price based on an estimate using the direct labor hours and a burden applying to direct labor hours.

NOTE: The foregoing are all the departments that have been considered in this subject of cost finding, because they are the only departments truly associated with a foundry. In many cases, there are additional departments, such as a machine shop, or a pattern shop, plating department or any other department. The same general routine can be employed for any of these special departments in a manner as outlined above to find the burden rates that apply per hour of direct labor.

Illustrative Problem

Assume operations are "normal" and production of 100,000 lb of good castings for the year. Fixed overhead and operating overhead may be shown for the year as follows:

Fixed Overhead		
1. Rent		$1,000.00
2. Building maintenance		600.00
3. Taxes		150.00
4. Insurance		75.00
5. Depreciation of buildings		100.00
Total		1,925.00
6. Depreciation of equipment		700.00
7. Administration	$2,000.00	
8. Sales	500.00	
Total		2,500.00
Grand total		$5,125.00
Operating Overhead		
1. General labor		$ 600.00
2. Plant supervision		1,800.00
3. Heat		100.00
4. Supplies		75.00
5. Compensation		150.00
6. Scrap		1,000.00
7. Laboratory		100.00
Total		$3,825.00
Total operating and fixed overhead expense		$8,950.00

Since we are operating "normal," we must absorb all of the Fixed Overhead, namely, $5125. We must also absorb (regardless of operating conditions) all of the Operating Overhead, namely, $3825.

Fixed and operating overheads are distributed to the various departments on the basis of prime labor payroll dollars and floor space and value of equipment. Assume the *floor space* is divided as follows:

20%—Melting Department
40%—Molding Department
20%—Core Department
10%—Cleaning Department
10%—Inspection, Shipping Department

Assume *equipment* distributed as follows:

30%—Melting Department
20%—Molding Department
30%—Core Department
15%—Cleaning Department
5%—Inspection, Shipping Department

In an actual foundry, these items will be found by taking the dollar value of the equipment in each department and then applying the proper depreciation rate.

Assume *payroll* is departmentalized as follows:

	Dollars Prime or Direct Labor	% of Total
Melting	$ 300.00	5.0
Molding	3,000.00	50.0
Coremaking	1,350.00	22.5
Cleaning	750.00	12.5
Inspection, shipping	600.00	10.0
	$6,000.00	100.0

Distribution of overhead by departments then may be broken down as shown in the accompanying table, "Departmental Overhead Distribution."

OVERHEAD:

It was decided that normal business would be the average tonnage of good castings produced per year, taken over the years 1936 to 1940 inclusive.

For those companies not in business during that period it was decided that the base period would be the tonnage of good casting produced in the years 1941 to 1944 inclusive. This tonnage for the various years would be adjusted as follows:

1941—divided by 2
1942—divided by 3.25
1943—divided by 3.67
1944—divided by 3.84

If the plant was in operation all of these years, then the average of these figures could be taken as a dividing factor. This average figure is 3.19.

These factors are based on figures submitted to the Non-Ferrous Founders' Society by the OPA; 1940 business was used as the base, 1941 business was 200 per cent, 1942 business was 325 per cent, 1943 was 367 per cent and 1944 was 384 per cent.

A foundry having any other method that is more truly representative of normal business, is free to use it in determining a legitimate normal volume of business.

FIXED OVERHEAD:

1. Rent.

2. Building maintenance and watchmen, including any protective services such as A.D.T.

3. All taxes except income taxes and sales taxes.

4. Insurance. All insurance except workmen's compensation, group life or health unemployment insurance.

5. Depreciation of buildings and/or leasehold improvements.

6. Depreciation of equipment.

7. Administration and office expense.

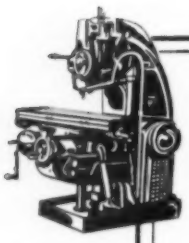
(*Concluded on page* 152)

Departmental Overhead Distribution

Department	% Prime or Direct Labor Distribution	% Floor Space Distribution	% Equipment Distribution	*Allocation of all Operating Overhead and Items 7 & 8 of Fixed Overhead	**Allocation of Items 1 Through 5 of Fixed Overhead	***Allocation of Item 6 of Fixed Overhead	Total Fixed & Operating Overhead Charge
Melting	5.0	20	30	$ 316.25	$ 385.00	$ 210.00	$ 911.25
Molding	50.0	40	20	3,162.50	770.00	140.00	4,072.50
Coremaking	22.5	20	30	1,423.13	385.00	210.00	2,018.13
Cleaning	12.5	10	15	790.62	192.50	105.00	1,088.12
Inspection and shipping	10.0	10	5	632.50	192.50	35.00	860.00
Total	100	100	100	$6,325.00	$1,925.00	$700.00	$8,950.00

* Based on percentages of payroll distribution. Items 7 and 8 are administration and sales. ** Based on percentages of floor space distribution. Items 1 through 5 are rent, building maintenance, taxes, insurance, and building depreciation. *** Based on percentages of equipment distribution. Item 6 is depreciation of equipment.

. . . NOW 25% *average*

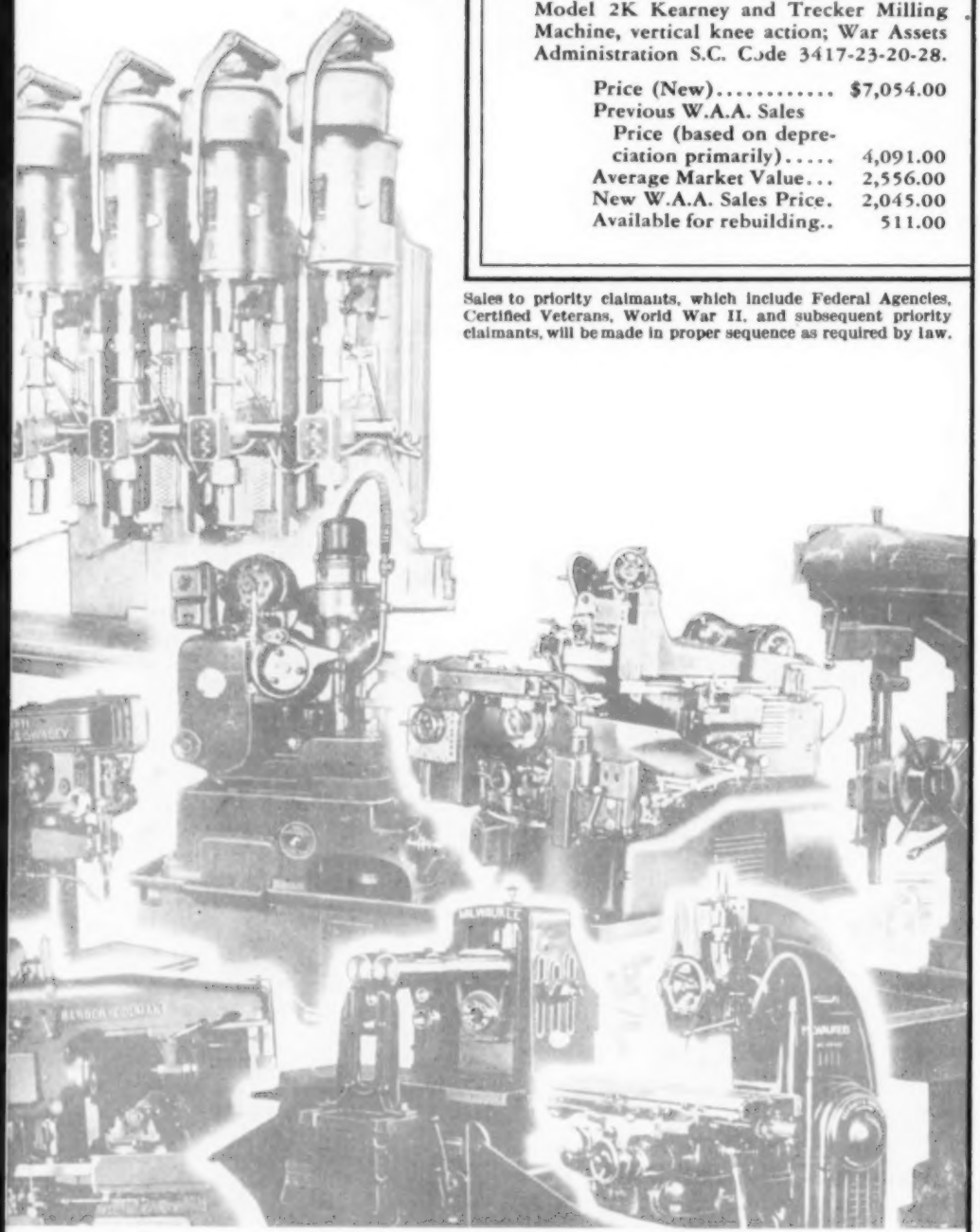


TYPICAL CASE—
MILLING MACHINE

Here is how War Assets Administration's new price has been set for a typical machine; Model 2K Kearney and Trecker Milling Machine, vertical knee action; War Assets Administration S.C. Code 3417-23-20-28.

Price (New).....	$7,054.00
Previous W.A.A. Sales Price (based on depreciation primarily).....	4,091.00
Average Market Value...	2,556.00
New W.A.A. Sales Price.	2,045.00
Available for rebuilding..	511.00

Sales to priority claimants, which include Federal Agencies, Certified Veterans, World War II, and subsequent priority claimants, will be made in proper sequence as required by law.



31 TYPES OF GENERAL PRODUCTION TOOLS REPRICED

- Boring Machine—Horizontal, Precision, Bridge Type, Single and Double End
- Chucking Machine—Automatic, Vertical, Multiple Spindle Type
- Chucking Machine—Single Spindle Automatic, Horizontal Turret Type Machine
- Chucking Machine—Six Spindle Automatic, Horizontal
- Drilling Machine or Drill Press—Bench or Floor, Single or Multiple Spindle
- Gear Cutting Machine for Straight Bevel Gears, (Not Planer Type)
- Gear Hobber—Horizontal
- Gear Hobber—Vertical, Universal
- Gear Shaper—For External Spur Gears Only
- Gear Shaper—For Spur Gears, External or Internal
- Gear Shaper—For Spur and Helical Gears, External and Internal
- Gear Tooth Shaver—For External and Internal Gears (Rotary Type Machine)
- Gear Tooth Grinder—Generating Type, for Spur and Helical Gears
- Gear Tooth Grinder—For Spur Gears, External and Internal (Formed Wheel Type Machine)
- Grinders—Centerless
- Grinder—Crank Pin Grinders
- Grinders—Plain External Cylindrical Grinder
- Grinder—Internal, Cylindrical, Automatic Sizing
- Grinder—Internal Cylindrical (Hydraulic Feed Machine)
- Grinder—Internal Cylindrical, Hydraulic Feed, for Hole and Face Grinding
- Grinder—Surface, Rotary Table Type
- Lathe—Multiple Tool, Not Automatic, Manufacturing Type Production Lathe
- Milling Machine—Automatic and Manufacturing Knee Type
- Milling Machine—Plain Bed Type, Horizontal Spindle Machines
- Milling Machine—Vertical, Knee Type (Not Including Bench Type)
- Polishing and Buffing Machine—Bench and Floor
- Profiling Machine—Vertical, Fixed Bed Type, Single and Multiple Spindle
- Tapping Machine—Vertical, Single or Multiple Spindle
- Thread Grinding Machines
- Thread Milling Machine
- Turret Lathe—Ram Type, Plain and Universal

MACHINE TOOL
SALES DIVISION

BELOW MARKET

NEW "FIXED PRICE" POLICY ESTABLISHED ON 31 TYPES OF SURPLUS MACHINE TOOLS

Here is good news indeed for the man who is trying to purchase general purpose production tools for replacement, reconversion or new enterprises. Now you can go into any of War Assets 33 Regional Offices, any machine tool site sale in the United States, or any approved War Assets Administration dealer and buy at the same fixed price, everywhere, the tools in these 31 groups listed at the left. No waiting for complicated figuring of prices, checks against priorities or other delaying factors. The tools are available in such quantity that your purchase can be cleared on the spot, and immediate delivery arranged.

But even more important is the principle under which the new low prices have been set. As the scale at the right indicates each price takes into consideration your costs of rebuilding the tool to new condition, engineering, service, etc. It is set well below the current market price for similar equipment sold on a full service basis. The differential is approximately 25% below market—enough for men with tooling "know-how" to realize a neat "extra" profit and at the same time acquire modern machine tools.

Plan now to check at once the detailed price and specifications list—now available in every War Assets Administration office (machine tool sales division) and the offices of your approved W.A.A. machine tool dealers.

FOR DETAILED PRICE CATALOG— *WRITE, WIRE OR PHONE:*

1. *Your Regular Machine Tool Dealer*
   War Assets Administration has appointed more than 3,000 "approved" dealers throughout the U. S.
2. *W.A.A. Machine Tool Sales Division*
   In any of the 33 War Assets Administration Regional Offices listed below.

686-1

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

W. A. A.'s NEW PRICING PRINCIPLE

ORIGINAL COST

DEPRECIATION BASED PRIMARILY ON TIME

PREVIOUS W.A.A. PRICE

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FULL SERVICE MARKET VALUE

ALLOWANCE FOR COMPLETE REBUILDING AND ENGINEERING SERVICE

NEW PRICE LEVEL

EXTRA PROFIT AREA

For Alert Buyers With Tooling "Know-How." You can completely rebuild the tool, meet engineering and haulage costs and still save money.

(*Concluded from page 149*)

directors' fees, dues, subscriptions, legal expense, auditing expense, etc.

8. Sales expense — commissions and advertising.

The basis for depreciation shall be the cost of reproduction, new, including freight and installation, based on an actual appraisal or a fair replacement value. The depreciation rates shall be those set up by the Internal Revenue Bureau.

The least portion of fixed overhead which must be absorbed is that percentage of the total fixed overhead that the current volume of business in pounds of good castings produced during any predetermined period bears to the normal volume of business.

If at any time new facilities are added or taken away, an adjustment should be made in the normal business volume figure.

Having determined the percentages of normal, as described previously, then that percentage of fixed overhead must be absorbed in the various departments. Items 1 to 5 are preferably distributed to the departments on the basis of floor space in each department. Item 6, on the basis of value of equipment installed and Items 7 and 8, on the basis of total prime payroll dollars in each department.

OPERATING OVERHEAD:

1. General plant labor.
2. Plant supervision and plant office help.
3. Fuel and power — supplies and tools. Note: Not chargeable to any particular department.
4. General supplies.
5. Workmen's compensation insurance.
6. Loss on product—scrap—including returns from customers.

The entire operating overhead must be distributed to and absorbed in the various departments. The total operating overhead is distributed on the basis of total prime payroll dollars in each department.

Typical Annual Summary Of Departmental Costs

METAL

Metals purchased—$13,330 for 100,000 lb, or $0.1333 per lb.

Metal burden—$400 (Classes 1, 2, 3, 4 and 5 under "Metal Cost"), or $0.004 per lb. Purchase price plus burden is $0.1333+$0.004, or $0.1373 per lb.

Assume a 5 per cent shrinkage; 5 per cent of .1373 is .0069. Total metal cost then is $0.1373+$0.0069, or 14.42c per lb.

MELTING

Labor	$ 300.00
Fuel	150.00
Crucibles	75.00
Furnace maintenance	25.00
Supplies	50.00
Laboratory expense	50.00
Power	75.00
Operating & Fixed Overhead	911.25
	$1,636.25

$$\text{Melting cost per pound} = \frac{1636.25}{100{,}000} = 1.636\text{c.}$$

MOLDING

"Prime" labor—$3000 for 2400 hours.

Burden:

Prime labor, replacing defective castings	$ 60.00
Indirect labor	540.00
Supplies	175.00
Heat, light & power	25.00
Maintenance & repair labor	50.00
Operating & fixed overhead	4,072.50
	$4,922.50

$$\text{Burden per hour of "prime" labor} = \frac{4922.50}{2400} = \$2.06.$$

COREMAKING

"Prime" labor—$1350 for 1228 hours.

Burden:

Prime labor replacing cores on defective castings	$ 10.00
Indirect labor	90.00
Supplies	70.00
Heat, light & power	10.00
Fuel	35.00
Maintenance & repair labor	5.00
Fixed & operating overhead	2,018.13
	$2,238.13

$$\text{Burden per hour of "prime" labor} = \frac{2238.13}{1228} = \$1.83.$$

CLEANING

Direct labor—$750 for 822 hours.

Burden:

Prime labor replacing defective castings	$ 10.00
Indirect labor	90.00
Supplies	120.00
Repairs & maintenance labor	25.00
Fuel & power	20.00
Fixed & operating overhead	1,088.12
	$1,353.12

$$\text{Burden per hour of direct labor} = \frac{1353.12}{822} = \$1.65.$$

INSPECTION AND SHIPPING

Labor	$ 600.00
Supplies	50.00
Fuel & power	30.00
Fixed & operating overhead	860.00
	$1,540.00

$$\text{Inspection and shipping cost per pound} = \frac{\$1540.00}{100{,}000} = 1.54\text{c.}$$

Typical Casting Estimate

Blueprint shows a casting, estimated shipping weight 50 lb. This casting requires one core. Estimating Department gathers the following information:

Metal specification—85-5-5-5; a molder will make one casting per hour; a coremaker will require 15 minutes per core; it will take 30 minutes to chip, clean and grind casting.

Estimate: Metal price is $0.13 plus burden of $0.004, or $0.134. Shrinkage is 5 per cent of .134, or .0067. Total cost .134 plus .0067 =$0.1407 per lb.

Metal	50lb X .1407 =	$ 7.04
Melting	50lb X .01636 =	.82
Prime Molding Labor	1 hr X 1.25 per hr =	1.25
Molding Burden	1 hr X 2.06 per hr =	2.06
Prime Core Labor	¼ hr X 1.10 per hr =	.28
Core Burden	¼ hr X 1.83 per hr =	.46
Prime Clean Labor	½ hr X .90 per hr =	.45
Clean Burden	½ hr X 1.65 per hr =	.83
Inspection & Shipping	50lb X .0154 per lb =	.77
Total cost		$13.96

$$\text{Cost per pound} = \frac{\$13.96}{50} = 28\text{c}$$

Caution: This figure of cost per pound, namely, 28c, should not be considered in relation to any actual cost. All amounts, (dollars, tonnages, etc.) were picked at random and do not have any true relation to operating figures. They are used merely to show how the Cost System works.

AFA Nominating Committee Named

F. J. Walls, International Nickel Co. Inc., Detroit, immediate past president of the American Foundrymen's Association, has been named chairman of a nine-member nominating committee to choose a slate of officers and directors for the 1947 election of that society.

Other members, six of whom were selected from a list of candidates submitted by AFA chapters, are: M. E. Brooks, foundry engineer, Dow Chemical Co., Bay City, Mich.; R. S. Davis, manager, National Malleable & Steel Castings Co., Indianapolis; N. J. Dunbeck, vice president, Eastern Clay Products Inc., Jackson, O.; R. F. Harrington, foundry superintendent, Hunt-Spiller Mfg. Corp., Boston; Harry Ladwig, assistant general superintendent, Allis-Chalmers Mfg. Co., Milwaukee; J. J. McFadyen, general superintendent, Galt Malleable Iron Co. Ltd., Galt, Ont.; R. J. Teetor, president, Cadillac Malleable Iron Co., Cadillac, Mich., AFA president in 1944-45; and Elbert C. Troy, metallurgist, Dodge Steel Co., Philadelphia.

Book Review

ASTM Methods Chemical Analysis of Metals, cloth, 402 pages, 6 x 9 inches, published by American Society for Testing Materials, 1916 Race street, Philadelphia 3. Price $4.50.

This newly revised edition of the American Society for Testing Materials' volume on standard methods of chemical analysis of metals replaces the 1943 edition and gives in their latest form 35 extensive standards developed by the society's committees concerned with analyzing metals and their alloys. This book, containing some 82 pages more than its predecessor, includes modernized versions of older methods widely used throughout industry and several of the newer photometric methods as well as spectrochemical procedures for certain materials and elements.

Text not only describes the analytical procedure but also gives recommended practices relating to apparatus, reagents, methods of sampling, etc. Metals and alloys to which the methods can be applied include steel, cast iron, wrought iron, ferroalloys, aluminum, magnesium, copper, lead, zinc, nickel, lead and tin-base alloys and solders. Methods of chemical analysis described are intended for general use in buying and selling materials according to specifications, and are planned to provide such precision and accuracy that when used by competent chemists they will be found satisfactory for judging the adherence of materials to specifications.

YOU BET IT'S A LUXURY

IT MAY NOT SEEM TO BE — **But every time you use manual labor to lift flasks onto the shakeout . . . it costs you money! It costs you time! It costs you production! Yes . . . such manual labor is a luxury!**

BUT WHEN ROBINS FLOATEX SHAKEOUTS WITH AUTOMATIC FLASK LOADERS ARE PUT TO WORK—

They do your job cheaper. They automatically lift flasks and shake them out.

They do your job faster. They're "Job-Engineered" to handle a constant flow of flasks at *your* specific production rate.

They do your job better. The Shakeout and Automatic Flask Loader can be moved from job to job. Operators require virtually no experience.

There is a Robins Floatex Shakeout with Automatic Flask Loader designed for *your* job. Write today for complete information.

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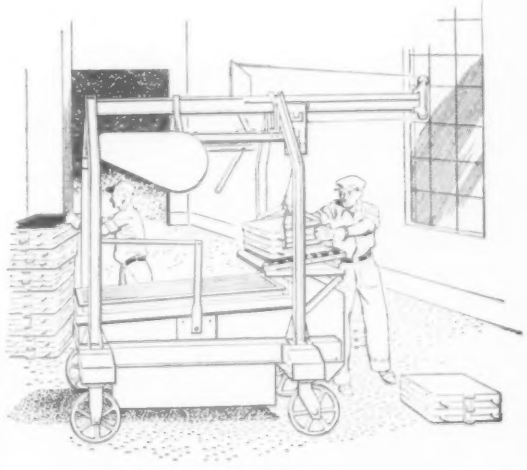

"Job-Engineered" to solve your problem

CHEAPER . . . FASTER . . . BETTER

Robins Conveyors Incorporated, Passaic, New Jersey — Division of Hewitt-Robins Incorporated

H. L. Edinger (top right), retiring president, presents the Gray Iron Founders' Society award for distinguished service to W. L. Seelbach. Other recipients shown counterclockwise, are: J. H. Pohlman, R. E. Kucher, A. E. Hageboeck and R. R. Washburn, who accepted the award for his father, H. S. Washburn. Not shown are W. J. Grede and R. D. Phelps, to whom similar awards were made

GRAY IRON FOUNDERS HOLD 18th ANNUAL MEETING

(*Continued from page* 91)

skills in supervisors, means of getting and keeping workers, and the veteran's training program. Dr. Joseph S. Kopas, Fenn College, Cleveland, declared that it is a simple matter for any foundry to organize and carry out a practical program of selection and development of supervisors. The program should start with the smallest unit of management, consisting of the first line supervisors and their immediate superior. Meeting for 1½ hours each week, this group covers at each session a section of a guide or manual previously prepared which details what the supervisors are to do and how. These meetings are continued until the second line supervisor has thoroughly explained what he wants his supervisors to do and the method of doing it. A co-ordinator, selected and trained for the program, records significant data and adds it to the guide. At the end of the series of meetings a procedure manual is organized and made available to each supervisor.

Helpful suggestions for getting and keeping foundry workers were offered by Frank O'Malley, personnel director, the Ferro Machine & Foundry Co., Cleveland. He pointed out that careful screening of job applicants is expensive, but it is more expensive to put a man to work who does not stick. The employment department as well as department heads should be provided with complete job descriptions to assist in interviews, and the new man should be placed on the type of work to which he is adapted, Mr. O'Malley stated. He also recommended the checking of applicants' previous work records, the giving of an adequate medical examination, and thorough preliminary instruction before the new worker starts on the job. Men not successful at one type of work may prove capable if transferred to a different job. Exit interviews also are helpful in holding some workers who want to quit. Working conditions naturally are a big factor in holding workers; so is an incentive bonus, the speaker said, adding also that not enough attention is given in the industry to efficient handling of human relations and supervision.

Explain Training Program

Dr. Frank August, manager, Veterans' Administration, Cincinnati, explained briefly the training program which any industry can develop under laws affecting veterans and recommended its adoption by foundries. He also urged investigation of manpower possibilities in veterans who have incurred some physical disabilities—a class of workers who have proved of better than average capability in industry when placed on the right kind of job.

Speaking at the second general session, J. Schaum, Naval Research Laboratory, Washington, described some of the results of fundamental research being conducted by the navy on gray iron. It is hoped this program, instituted more than a year ago, will be productive of data comparable in value to that developed through the laboratory's extensive research on steel castings.

(*Continued on page* 156)

WORKING CONDITIONS ARE IMPORTANT

The foundry needs energetic young personnel to maintain its position in industry and to attract these men, labor relations policies call for improved working conditions. Despite the difficulties imposed by sand, heat and metal, the foundry engineers of GIFFELS & VALLET, INC., have been able to build good working conditions in new plants. They have also made sound recommendations for improving established foundries by layout changes, isolation of critical conditions, heating and ventilating revisions and in other alterations peculiar to each condition. These engineers will design the plan for better working conditions and supervise the construction for greatest benefit per dollar cost.

GIFFELS & VALLET, INC.

INDUSTRIAL ENGINEERING DIVISION
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NEW OFFICERS, DIRECTORS OF THE GRAY IRON FOUNDERS' SOCIETY

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C. B. MAGRATH

JOHN McINTYRE

(*Continued from page* 154)

Mr. Schaum's discussion was concerned principally with studies of the solidification rate of gray iron, including investigations of the influence of carbon and silicon content and superheat. He also described the use of microradiography in studying graphite in cast iron, and observations on effect of time and temperature on stress.

E. L. Roth, Motor Castings Co., Milwaukee, presented a report of the society's Technical Committee, listing ten subjects which have been selected as part of a research program. These subjects, to be used in preparation of college theses, include: Effect of sulphur on physical properties of gray iron; study of conditions affecting surface finish of castings; relation of fatigue properties to physical structure of gray iron; comparison of arbitration test bars with those poured under specific conditions; correlation of sceleroscope, rockwell and brinell ratings of gray iron hardness; corrosion fatigue of welded joints; compression strength of coke; solubility of coke in molten iron; creep values at 600 to 800 F; relation between AFA green sand properties and actual values in the cope.

John M. Price, Ferro Machine & Foundry Co., Cleveland, reported on activities of the Joint Educational Committee of the ferrous foundry societies in seeking establishment of courses at various engineering schools which would lead to development of foundry engineers and managers. Institutions approached which have indicated willingness to institute such courses are Massachusetts Institute of Technology, Cornell University, Case School of Applied Science, University of Cincinnati and Purdue University.

Methods of reducing compensation costs, discussed by Edward P. McHugh, Cleveland, included: Reduce accidents as much as possible; select the most capable workers; have a good medical department; place the worker on a job best suited to his capabilities; have regular physical examinations, including chest x-rays; conduct an efficient safety program which is supported fully by top management; keep accurate records of injuries and the type of treatment given, and give complete data in reports of accidents.

In discussing "Foundry Modernization," Lester B. Knight, Lester B. Knight & Associates, Chicago, emphasized that mechanization is not always required in bringing the foundry to the desired point of efficiency. Foundry modernization, he declared, includes modern thinking by owners, managers and operators, as well as modern physical facilities. It includes modern sales engineering methods of marketing castings, as well as modern methods of producing them. Mr. Knight presented a number of slides to illustrate different types of foundry equipment and plant layout which have proved successful in improving production and efficiency in various size foundries.

At the third general session W. W. Coutts, executive vice president of the society, reported briefly on the principal activities of the organization during the last year, including regional group meetings, cost control work, dissemination of information on government regulations, etc.

A panel session on the subject of merchandising brought out discussion emphasizing the necessity of selling not merely a gray iron casting as such, but of marketing an engineering material service. E. C. Hoenicke, Foundry Divi-

(*Concluded on page* 159)

CONVINCING EVIDENCE OF *G-IRON SUPERIORITY

Photomicrograph 100 diam. unetched. Regular pig—Silicon 2.40, Total Carbon 4.04.

Photomicrograph 1000 diam. etched. Regular pig—Silicon 2.40, Total Carbon 4.04.

Photomicrograph 100 diam. unetched. G-Iron pig—Silicon 2.35, Total Carbon 4.10.

Photomicrograph 1000 diam. etched. G-Iron pig—Silicon 2.35, Total Carbon 4.10.

Examine closely this photograph of two pigs. Notice the refinement of grain structure of the *G-Iron pig (right) as compared with the regular pig (left).

Now inspect the photomicrographs which correspond with each pig...*convincing evidence of *G-Iron superiority.*

*G-Iron is graphitized pig iron. A patented blast furnace process refines the grain structure of the pig—and this refinement follows through to the final casting. The finely distributed graphite increases fluidity and reduces chill in thin sections—improves machinability and helps to overcome shrinkage and porosity between thin and heavy sections.

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TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of American Radiator & Standard Sanitary corporation

RANSOHOFF WET CLEANING MILLS

Automatic Star-Return

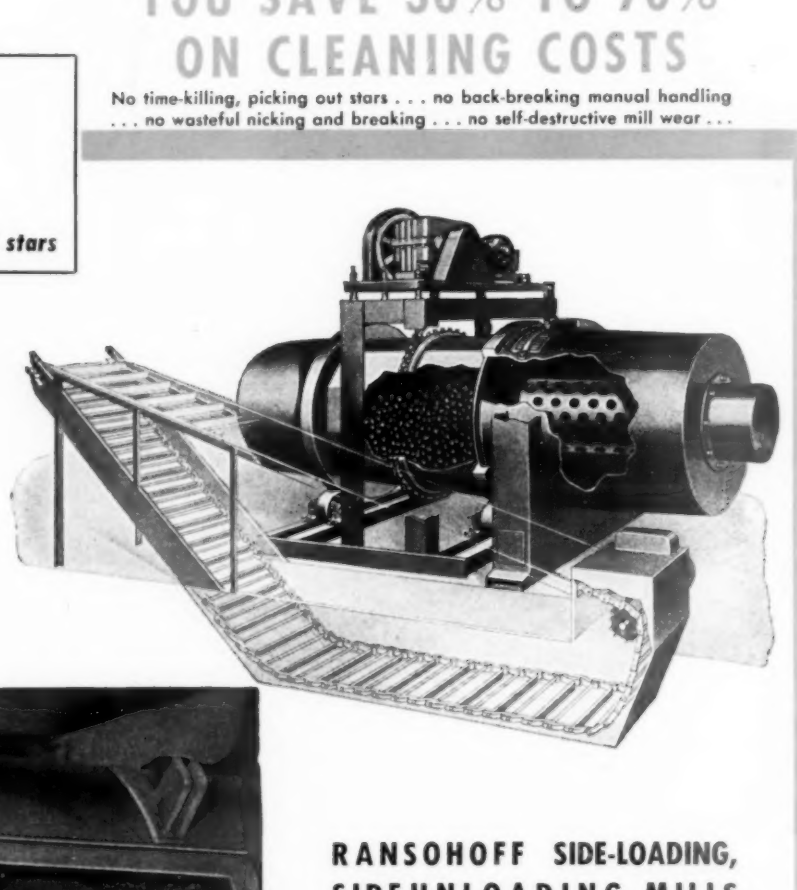
YOU SAVE 30% TO 70% ON CLEANING COSTS

No time-killing, picking out stars . . . no back-breaking manual handling . . . no wasteful nicking and breaking . . . no self-destructive mill wear . . .

- *Easy*
- *Gentle*
- *Speedy*
- *Economical*
- *No health hazards*
- *Automatic handling of stars*

RANSOHOFF END-LOADING END-UNLOADING MILLS

Loaded from conveyors or by power loaders. Equipped with patented discharge heads so that when rotated in one direction the tumbling medium is returned automatically to the tumbling compartment. When reversed, work is discharged automatically and tumbling medium is separated from the work. Castings and tumbling medium CASCADE AS A MASS WHICH PREVENTS NICKING, BREAKAGE AND EXCESSIVE MILL WEAR.



RANSOHOFF SIDE-LOADING, SIDE-UNLOADING MILLS

Load is placed in completely empty cleaning compartment, door is clamped shut and mill rotated in tumbling direction. Stars enter automatically. Because of the large number of stars which can be used cleaning time is about one-third of the average mill. STARS CHURN AGAINST THE WORK. NO PICKING STARS FROM CASTINGS IS NECESSARY AS STARS ARE SEPARATED AUTOMATICALLY.

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WRITE, WIRE OR PHONE FOR RANSOHOFF ENGINEERS TO TALK OVER YOUR CLEANING PROBLEMS

N. Ransohoff, Inc.

TOWNSHIP RD. AND BIG 4 RR **CINCINNATI 16, OHIO**

(*Concluded from page* 156)

sion, Eaton Mfg. Co., Detroit, was chairman of this session. Hermann P. Good, Textile Machine Works, Reading, Pa., pointed out that a sound cost system should be the first principle in the merchandising program of the future. He also stressed the importance of selling the proper type of casting for the job.

Carl W. Bonbright, General Foundry & Mfg. Co., Flint, Mich., listed various requirements for effective selling methods in future competitive markets.

D. J. Vail, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., explained that people buy a product for what it will do, not for what it is. Gray iron castings likewise should be sold with emphasis on their end use. Knowledge of customers' requirements as well as of the product is an essential of good salesmanship by the foundry, he declared.

A. E. Hageboeck, Frank Foundries Corp., Moline, Ill., and chairman of the society's Cost Committee, stated that gray iron foundrymen know how to make good castings but are relatively less effective in merchandising them at the proper price. He described the development of gray iron cost groups which now are established in New England, eastern Pennsylvania, western New York, Michigan, Wisconsin, Iowa, Chicago, Cincinnati, St. Louis and Pittsburgh. John L. Carter, cost consultant, Newark, N. J., discussed the history of cost control activities of the society and stated that more progress had been made the last year in establishing the gray iron industry on a sound cost basis than in the preceding 20 years.

Discussed Developments

At the concluding session Mr. Edinger, who had been chairman of the Gray Iron Castings' Industry Advisory Committee to OPA, discussed developments in the now extinct Maximum Price Regulation No. 244. Howard A. Stockwell reported on activities of the Advisory Committee to the CPA, and also of the Advisory Committee to the Industrial College of the Armed Forces. In reporting for the society's Membership Committee, R. J. Redmond, Buckeye Foundry Co., Cincinnati, stated that current membership of the organization totals slightly over 600.

Mr. Redmond served as chairman of the general committee for the convention which also included the following members: G. H. Alten, Alten's Foundry & Machine Works, Lancaster, O.; Homer Britton, Cleveland Foundry Co., Cleveland; J. H. Bruce, Bowler Foundry Co., Cleveland; H. K. Ewig, Cincinnati Milling Machine Co., Cincinnati; J. B. Heisler, A. C. Williams Co., Ravenna, O.; A. H. Kramer, Advance Foundry Co., Dayton, O.; W. J. MacNeill, G. H. R. Foundry Co., Dayton, O.; H. C. Nicholas, Quality Castings Co., Orrville, O.; C. A. Peebles, Stedman Foundry & Machine Works, Aurora, Ind.; P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.; A. J. Rumely, LaPorte Foundry Co., LaPorte, Ind., and E. H. Thompson, H. P. Luescher Co., Hamilton, O.

W. W. Beiser, Reliance Foundry Co., Cincinnati, was chairman of the Ladies Committee which provided entertainment for visiting ladies at the convention. The program included a luncheon each of the two days and a theatre party.

BRITISH STEEL FOUNDERS

Hold First Technical Convention

FIRST technical convention of the British Steel Founder's Association, which is barely a year old, was held at Sheffield, England, Oct. 4-5. The meeting was completely successful as regards technical interest, attendance and organization, and augurs well for the future of the association. A dinner was held on Oct. 3, preceding the sessions and works visits, and over 150 members and guests attended. Charles S. Gill, chairman of the association and managing director of Davy & United Roll Foundry Ltd., presided.

CHARLES S. GILL

Among the principal guests were the Lord Mayor of Sheffield; Sir Charles Goodeve, F.R.S., chairman, British Iron & Steel Research Association; W. Lechard, parliamentary secretary to the Minister of Supply; T. Makemson, secretary, Institute of British Foundrymen, representing president D. H. Wood, who was unable to attend, and J. G. Pearce, director British Cast Iron Research Association.

In proposing a toast of the BSFA Technical Committee, Sir Charles Goodeve called for a free exchange of information between the various members of the industry, and the pooling of knowledge for the general benefit of all concerned. Mr. Lechard, proposing the toast of the foundry industry, referred to this first convention as a historical occasion which would be a landmark in the development of the young association. He said that the industry in the last few years has made great strides in improving working conditions in foundries, and it was indicative of the measure of achievement that delegations from other counties had recognized the fact that Great Britain has taken the lead in the creation of conditions conducive to the highest productivity. Mr. Makemson declared that much of the criticism of steel foundries is not justified; foundry industry members' actions are evidence of the desire to improve conditions and technical efficiency to the greatest possible extent.

On Oct. 4, works visits were arranged at the steel foundries of David Brown & Sons (Huddersfield) Ltd., English Steel Corp. Ltd., Firth-Vickers Stainless Steels Ltd., Hadfields Ltd. and Samuel Osborn & Co. Ltd.

The technical sessions took the form of round-table discussions, the first of which was held on the evening of Oct. 4. Discussion centered around the report, "Sand Practice Current in the Lancashire and Yorkshire Region," introduced by R. S. Pratt, P. R. Jackson & Co. Ltd. with a commentary by T. R. Walker, English Steel Corp. Ltd. The paper was prepared by a panel of the Lancashire and Yorkshire Regional Technical Committee of the BSFA from data obtained from a questionnaire sent to all members of the region.

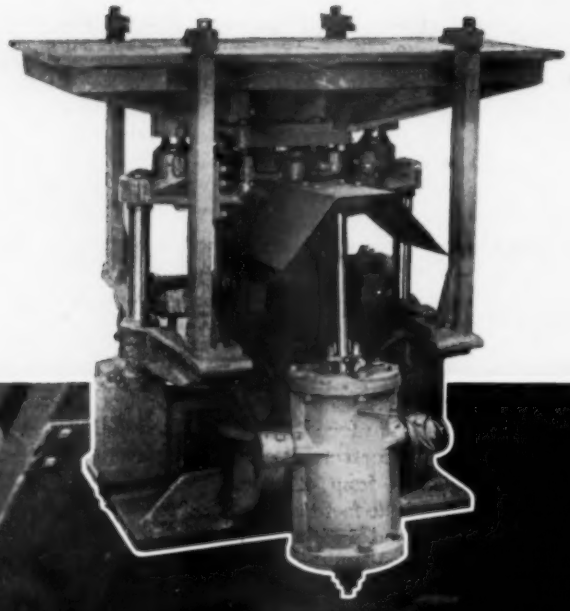
Information supplied to the committee indicated wide variations in the make-up and test properties of sand mixtures used successfully for making similar castings. This did not mean that it was very easy to make sound castings with a good finish, but rather emphasized the fact that the manipulation and treatment of the mixtures was different in various foundries.

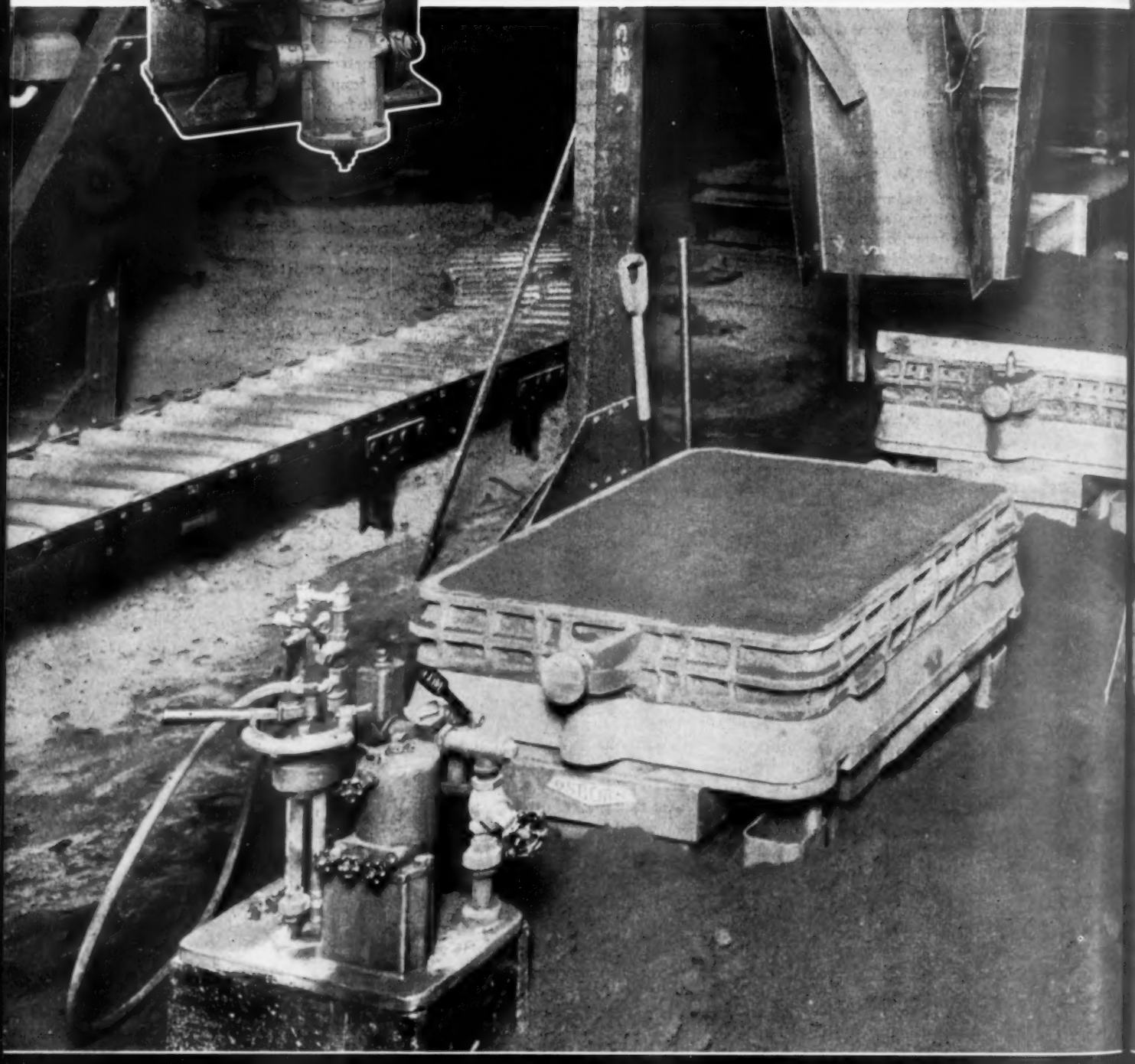
The properties of molding sand mixtures are considerably modified during milling, and investigations were suggested to find the methods of milling, including milling time, which would put sands of particular types into the best condition for foundry use. Skin-drying of molds, it was pointed out, is much cheaper than drying molds completely and saves fuel. It was suggested that many steel foundries do not make full use of this process

(*Concluded on page* 162)

OSBORN'S IN

is easier and a





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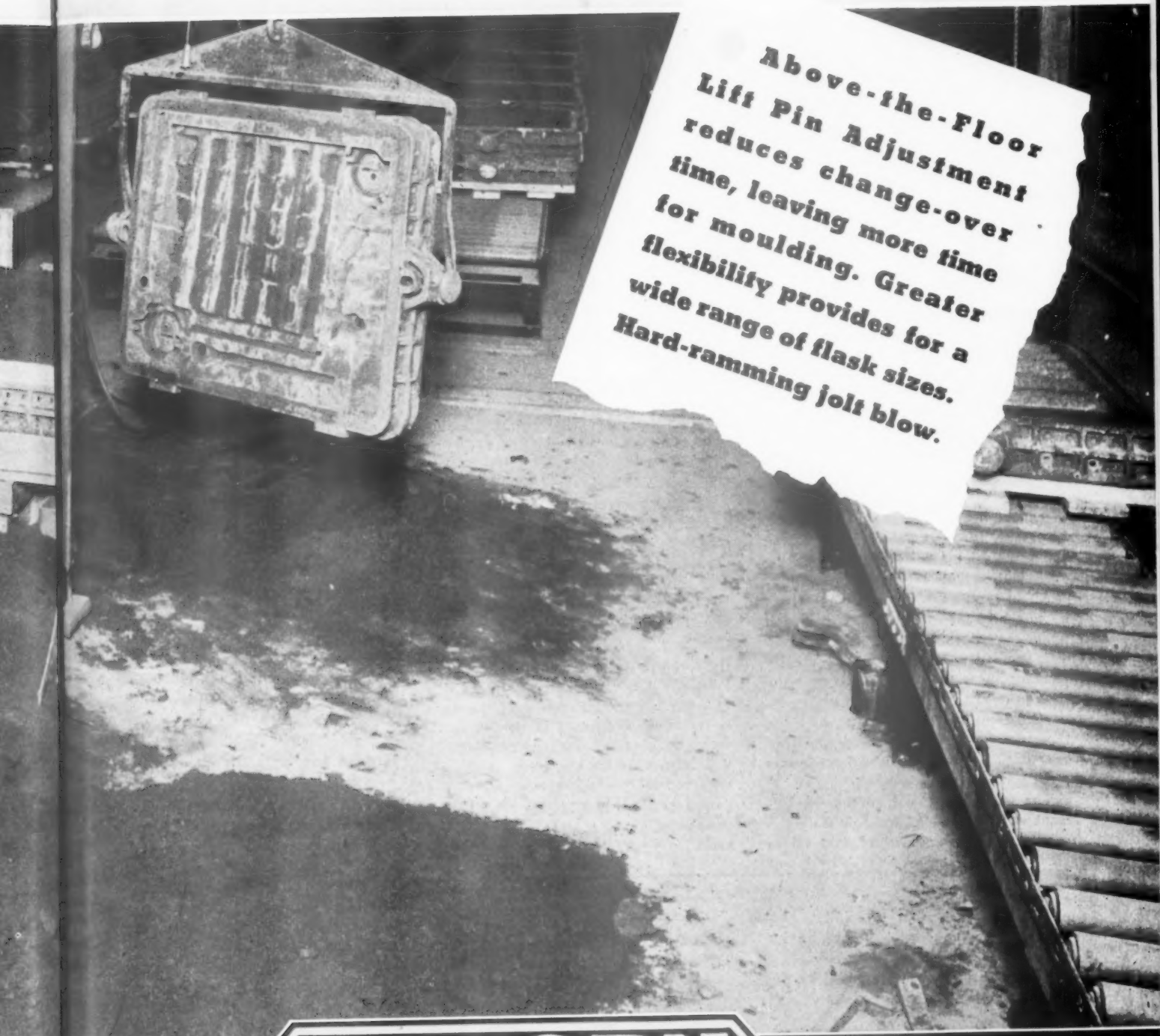

Above-the-Floor Lift Pin Adjustment reduces change-over time, leaving more time for moulding. Greater flexibility provides for a wide range of flask sizes. Hard-ramming jolt blow.

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MOULDING MACHINES

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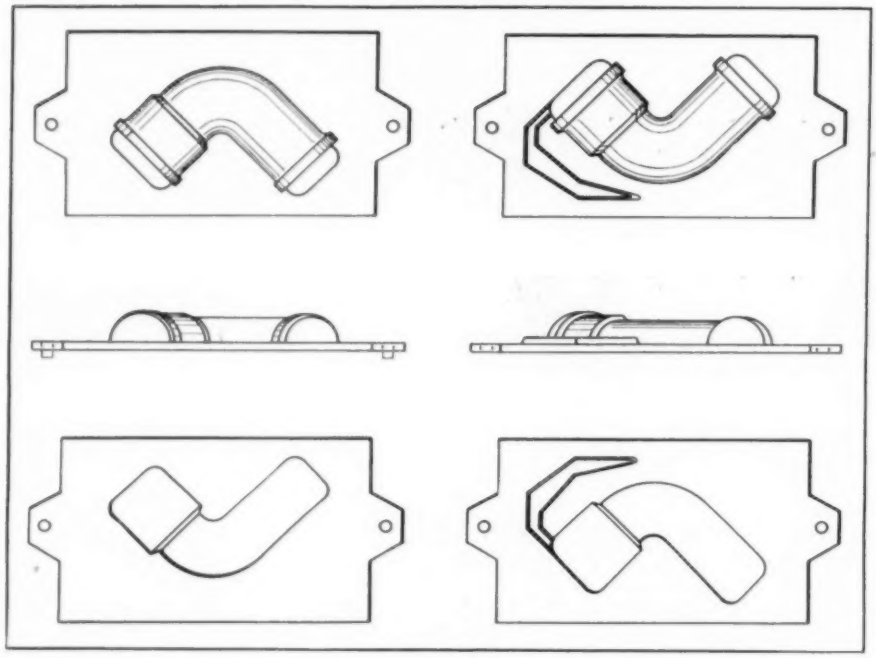
MATCHPLATES PROVIDE
Both Core and Mold



Top, side and bottom views of two matchplates, each of which has half pattern on one side and half corebox on the other side

By THOMAS BOYD

RESTRICTED supply of soil pipe and fittings has been one of the limiting factors in past months in preventing housing construction from increasing to desired levels. A major handicap in efforts to raise operations of soil pipe foundries is the fact that it is practically impossible to obtain men skilled in making such castings with the shell pattern and lift-out core.

About a year ago the writer developed a method for increasing production under the present unfavorable conditions. This method is indicated by the accompanying illustration. Experience over the past year shows that production is increased from 20 to 30 per cent, by using the squeezing machine and foundry labor of average intelligence but without former experience or skill.

The method is based on the employment of two matchplates constituting a corebox, pattern and matchplate all in one piece. Each plate has one-half a shell pattern on one side, and half corebox on the other side. In practice, a cast iron arbor with an offset arm is placed in what is to be the drag half of the corebox. Both coreboxes are filled with sand, squeezed and booked to form a complete core. While the plates are still together, the cope flask is placed in position, filled with sand and squeezed. The assembly is inverted and the drag is filled with sand, squeezed and lifted off. The drag matchplate is removed. The drag is replaced and the assembly is rolled over to bring the cope to proper position on top. The cope is lifted off. The top plate is removed and the cope is replaced. The mold is then in condition to be filled with molten iron. It will be noted that the green sand core rests securely in the prints and is not moved or disturbed at any time in the process of making and assembling the mold.

(*Concluded from page* 159)

and that its possibilities should be investigated.

Wide variations were reported in the proportion of used sand reclaimed, and in reclamation methods. It was pointed out that reclaiming used sand saves the expense of sending it out as rubbish, and reduces the quantity of new sand required. The best method of treating used sand to make it good enough to replace a large proportion of new sand must be worked out in individual foundries, but it appeared evident that much more sand could be reclaimed than is at present.

The questionnaire showed that most foundries use mold or core paints. During the last few years a number of non-siliceous paints have been developed and others are under investigation. It was emphasized that the technique of applying these paints is just as important as the constituent materials, and methods of application to obtain the best results should be carefully studied.

On Oct. 5, another round-table discussion was on the "Relationship Between Temperature and Fluidity in Converter and Electric Steels," introduced by L. W. Sanders, Lake & Elliot Ltd., Braintree, Essex. The paper described experiments with a foundry test for the fluidity of molten steel conducted by L. W. Sanders and C. H. Kain. The results indicate that temperature rather than the method of steelmaking is the deciding factor in fluidity. There appears to be a marked increase of fluidity at temperatures over 1580 C, this change point being more pronounced in converter than in basic electric steel.

Following this discussion, Basil Gray, special director, English Steel Corporation Ltd., and chairman of the Main Technical Committee of the BSFA, described in detail the purpose and organization of the committee.

According to Mr. Gray, formation of the BSFA Technical Association was the logical outcome of a gradual change in management's outlook from strict isolationism in the matter of divulging their methods or opening their shops to visitors, to a recognition of the futility of such secrecy. Any advantages gained from a few more or less exclusive methods were realized to be offset by the resulting ignorance as to the methods of competitors.

Set Up Objectives

To further the drive to efficiency the BSFA set up the following objectives:

1. The best co-operation and discussion on their common problems between the maximum number of individuals.

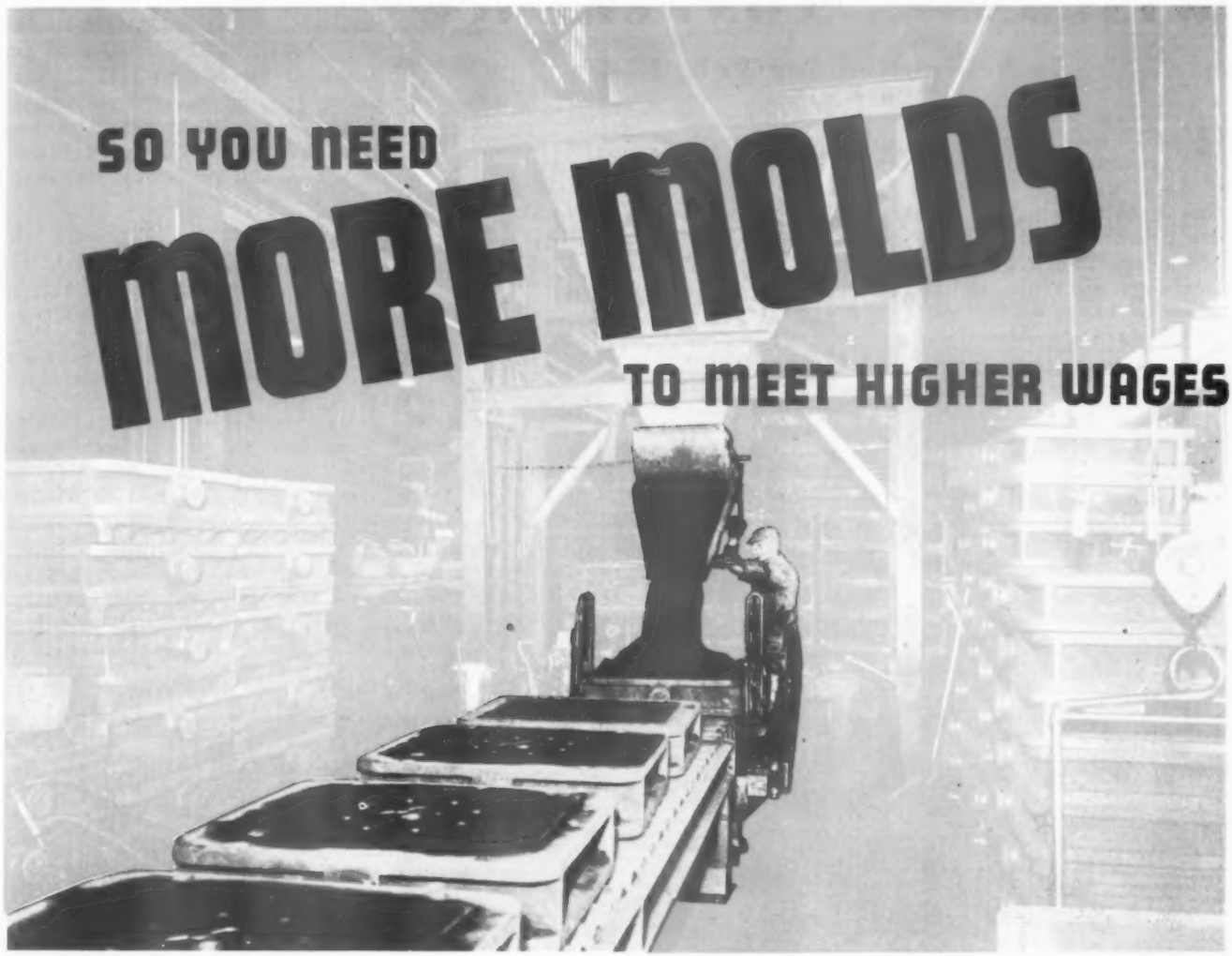
2. Surveys of the plant used, and its difficulties and weaknesses.

3. Management problems such as maintenance, planning, rate-fixing, etc.

4. Surveys of day-to-day technical problems of all kinds associated with patternmaking, molding, steelmaking, running, heading and dressing, and good housekeeping.

5. Controlled experiments to elucidate points of importance brought to light by the surveys mentioned.

All the activities mentioned are within the province of the Regional Committees. The Main Technical Committee is merely there to co-ordinate and direct the work, and to be the means whereby outside scientific and technical assistance may be obtained. One of the most important activities of the committee has been to review all the specifications ordinarily used for steel castings, with a view to approaching the British Standards Institute on the question of drawing up a revised series covering the whole field.



So you need more molds per man-hour to meet higher wages—and a little later, keener competition. Herman Molding Machines are designed for just that—more molds and fewer man-hours labor.

Herman engineers have been designing molding machines exclusively for over forty years and have developed many patented features which you will find exclusively on Hermans.

You can fill your foundry floors with profitable low-cost molds made three to four times faster than by old methods when you use Herman Molding Equipment. Herman Molding Machines employ fast, sure, powerful, steady hydraulic power. . . and only Herman Molding Machines give the patented roll-over action that provides a complete 180° roll-over with power applied on only 90° of the roll!

Ask to have a Herman engineer call on you to explain the advantages Herman Molding Machines offer in increasing mold production at lower unit cost—and molds that produce perfect castings.

MOLDING HERMAN MACHINES

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WISCONSIN CONFERENCE

Is Scheduled for Feb. 13-14

TENTH regional foundry conference, sponsored by the Wisconsin Chapter of the AFA and the University of Wisconsin, will be held Thursday and Friday, Feb. 13-14, at the Hotel Schroeder, Milwaukee. This will mark the 20th anniversary since the first Wisconsin conference, which was held Feb. 1 to 4, 1927, under the auspices of the university's Department of Metallurgy and Extension Division at Madison, Wis.

Accompanying views show the participants in three of the early meetings. The first conference attracted 78 representatives from 61 foundries, but during the intervening years attendance has grown steadily. At the 1946 conference registration was in excess of 600 with more than 750 present for the banquet.

Sectional meetings covering presentation of technical papers on steel, gray iron, malleable iron, nonferrous metals and patterns are scheduled for three sessions of the 1947 conference. The two-day program, complete details of which will be announced later, also will include two general meetings and two luncheon meetings. Dr. Kuebler, president of Ripon College, will address the conference at the banquet Thursday evening.

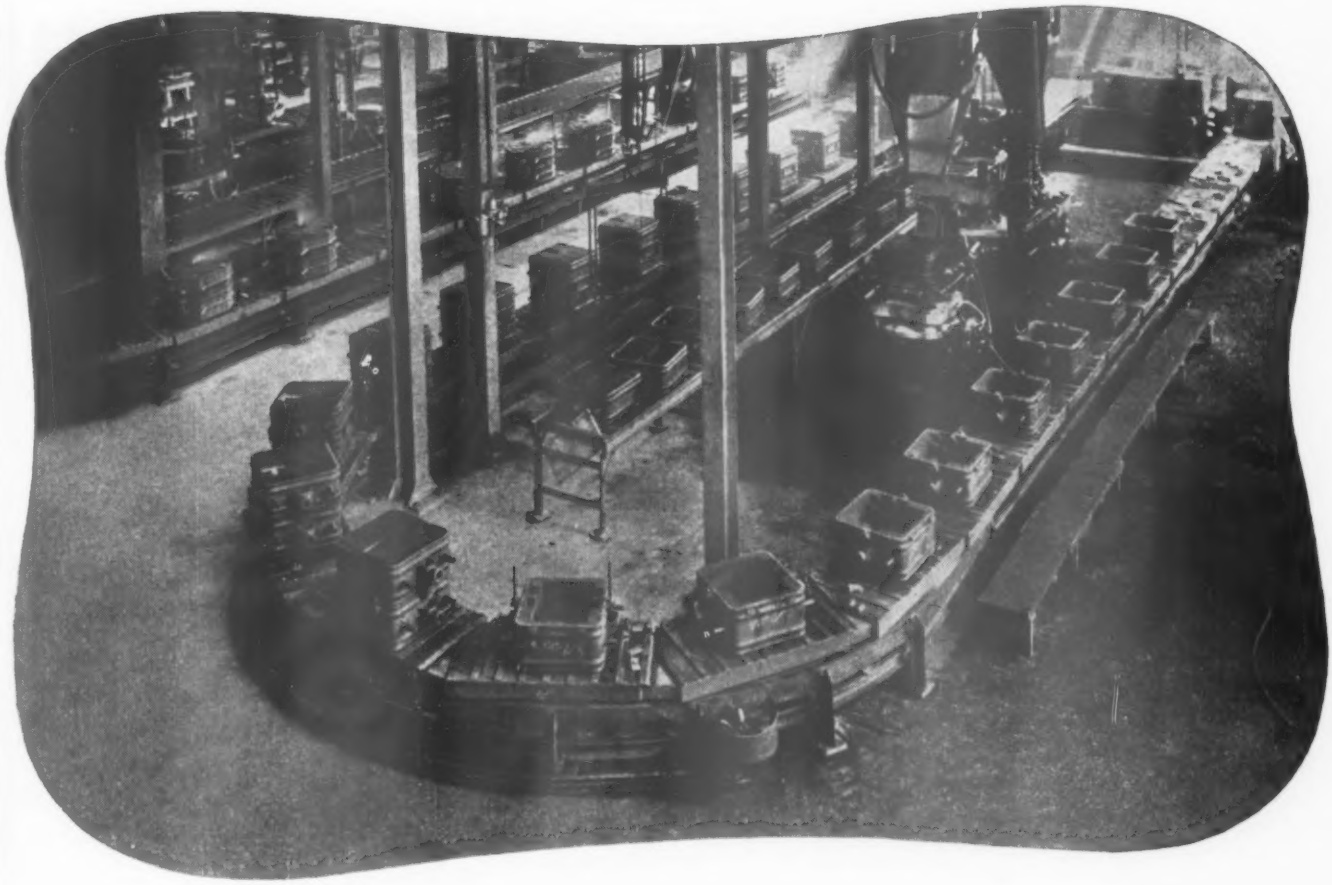
At the first meeting held at the university in 1927, the following speakers appeared: R. S. McPherran, Allis-Chalmers Mfg. Co., Milwaukee; H. W. Dietert, United States Radiator Corp., Detroit; William S. Ford and A. E. Murphy, William S. Ford & Co., Milwaukee; C. A. Busche, Prime Mfg. Co., Milwaukee; W. J. McNeill Federal Malleable Co., West Allis, Wis.; A. T. Baumer, Milwaukee Steel Foundry Co., Milwaukee; C. I. Wesley, Wesley Treating Co., Milwaukee; Carl Johnson, Gisholt Machine Co., Madison; and the following professors of the university: F. E. Turneaure, dean, college of engineering; R. S. McCaffery, J. F. Oesterle, department of metallurgy; W. H. Dudley, university library; S. W. Gilman, department of economics.

Book Review

Proceedings 1944-45 of the Institute of British Foundrymen, cloth, 327 pages, 7¼ x 9¾ inches, published by the Institute of British Foundrymen, Saint John Street Chambers, Deansgate, Manchester 3, England.

Each year the Institute of British Foundrymen prepares a bound volume containing papers and discussions presented at its annual general meeting, and a selection of papers presented at various branch meetings. The present volume contains those for the 1944-45 session, and comprises 11 papers presented at the general meeting held in London and 15 at branch meetings.

Participants in three of the early Wisconsin Foundry Conferences. Bottom panel shows group at the first conference, held in 1927 at the University of Wisconsin, Madison



These Curves Have Angles Too

Traveling in an endless loop past the molding stations, the pouring zone, along the cooling run to the shakeout, and back to the molders again, Bartlett-Snow continuous mold conveyors enable foundry owners and plant managers to get a maximum of both quantity and quality from their plants. Individually engineered to your own particular plant requirements, Bartlett-Snow foundry equipment reduces the number of defectives, increases output, reduces costs, minimizes labor difficulties by giving the workers a larger take home pay, easier. And smoother, more continuous production returns increased profits, larger dividends to you. Can we send you more detailed information?

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FOUNDRY SAND, MOLD AND CASTINGS HANDLING

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Dust recovery

To stand up under the severest conditions of continuous usage, cyclone bodies and cones in Buell Dust Recovery Systems are fabricated of extra-thick steel, completely seal-welded inside and out and ground flush to form a smooth, homogeneous surface. Hoppers are braced and stiffened with 3" channels to resist vibration.

This extra-sturdy type of construction is possible only with large-diameter cyclones and is one of the plus values that have made Buell Dust Recovery Systems famous throughout industry for long life and low maintenance. Due to their sturdy construction Buell installations have been in service three, four, five or more years without the replacement of a part.

How the patented "shave-off" of the van Tongeren cyclone (found only in Buell Dust Recovery Systems) makes it possible to use large diameters and, at the same time, obtain high collection efficiencies is fully described in a 28-page book: "The van Tongeren System of Industrial Dust Recovery." We will be pleased to send you a copy without charge. Write for it today.

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2. LARGE DIAMETERS
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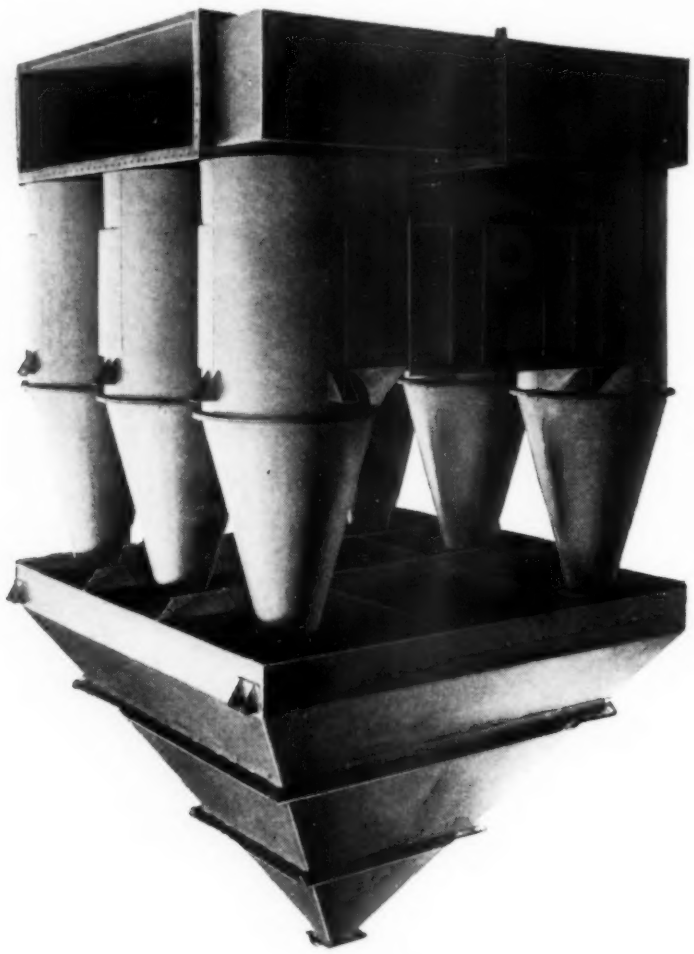

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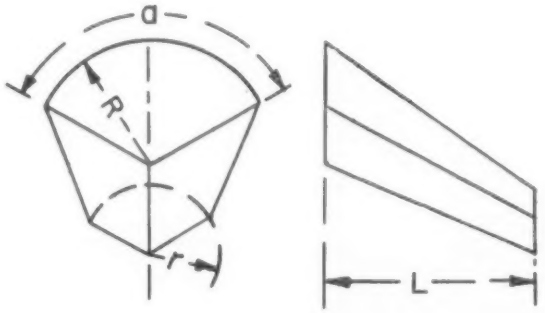
FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS

(Continued from November)



To find the weight of a sector of a frustrum of a cone, multiply the sum of the radius of the large base squared, the radius of the small base squared and the product of the radii by the length, by the number of degrees in the angle, by the value of C. (See Table VII, page 138, November issue).

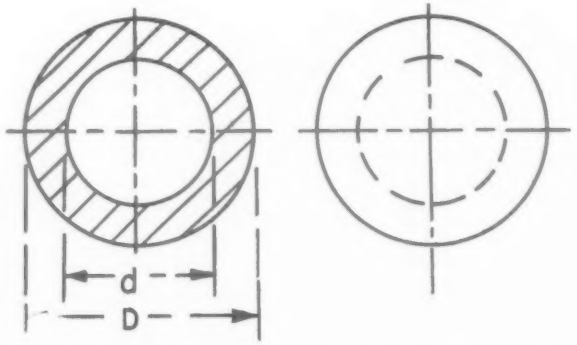
$$W = (R^2 + r^2 + R\,r)\,L\,a\,C$$

Table VIII

Wt. per cu. in.	K	M	Wt. per cu. in.	K	M	Wt. per cu. in.	K	M	Wt. per cu. in.	K	M
.096	.048	.0503	.210	.105	.1100	.330	.165	.1728	.450	.225	.2356
.100	.050	.0524	.220	.110	.1152	.340	.170	.1780	.460	.230	.2408
.110	.055	.0576	.230	.115	.1204	.350	.175	.1832	.470	.235	.2460
.120	.060	.0628	.240	.120	.1257	.360	.180	.1885	.480	.240	.2513
.130	.065	.0680	.250	.125	.1309	.370	.185	.1937	.490	.245	.2565
.140	.070	.0732	.260	.130	.1361	.380	.190	.1989	.500	.250	.2617
.150	.075	.0785	.270	.135	.1414	.390	.195	.2042	.510	.255	.2670
.160	.080	.0838	.280	.140	.1466	.400	.200	.2094	.520	.260	.2722
.170	.085	.0881	.290	.145	.1518	.410	.205	.2146	.530	.265	.2774
.180	.090	.0943	.300	.150	.1571	.420	.210	.2199	.540	.270	.2827
.190	.095	.0995	.310	.155	.1623	.430	.215	.2251	.550	.275	.2879
.200	.100	.1047	.320	.160	.1675	.440	.220	.2303	.560	.280	.2931

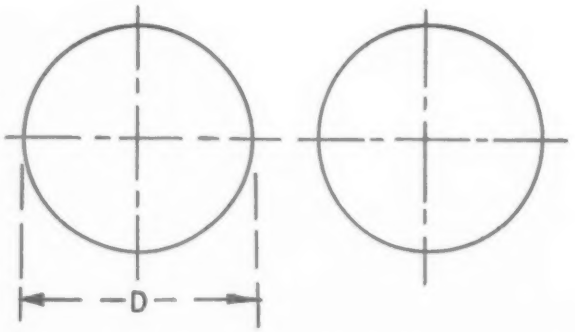
Interpolation Table

Ad'l wt.	Ad'l K	Ad'l M	Ad'l wt.	Ad'l K	Ad'l M	Ad'l wt.	Ad'l K	Ad'l M
.001	.0005	.0005	.004	.0020	.0021	.007	.0035	.0037
.002	.0010	.0010	.005	.0025	.0026	.008	.0040	.0042
.003	.0015	.0016	.006	.0030	.0031	.009	.0045	.0049



To find the weight of a hollow sphere, multiply the difference between the cubes of the outside and inside diameters by the constant, M, corresponding to the weight per cubic inch. (Table VIII).

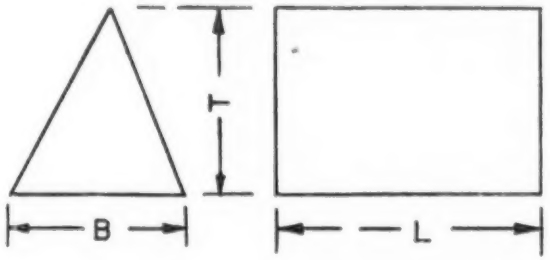
$$W = (D^3 - d^3)M$$



To find the weight of a solid sphere, multiply the diameter cubed by the constant, M, corresponding to the weight per cubic inch. (Table VIII).

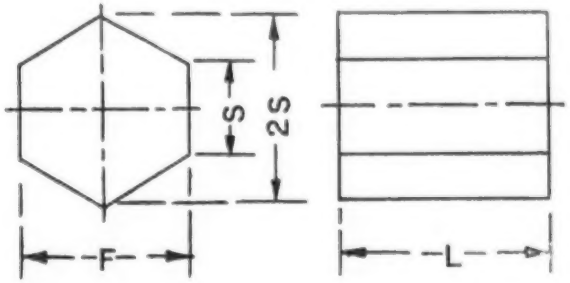
$$W = D^3M$$

FORMULAS FOR DETERMINING THE WEIGHTS OF CASTINGS



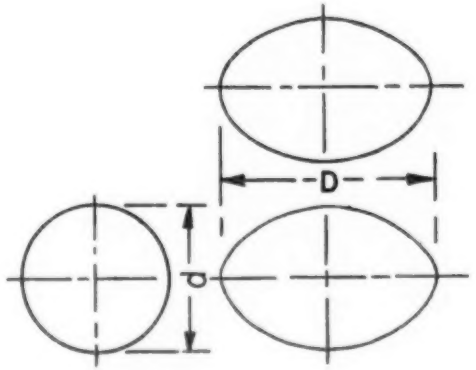
To find the weight of a solid triangular casting, multiply the length by the width, by the thickness, by the constant, K, corresponding to the weight per cubic inch of material used. (See Table VIII, page 167).

$$W = LBTK$$



To find the weight of a hexagonal casting, multiply the square of the side by the length, by the constant, K, corresponding to the weight per cubic inch, or multiply the square of the distance across the flats by the length by the value of M (See Table IX).

$$W = S^2 L K \text{ or } W = F^2 L M$$



To find the weight of an ellipsoid, multiply the square of the revolving axis by the fixed axis by the constant, M, corresponding to the weight per cubic inch. (See Table VIII, page 167).

$$W = Dd^2 \times M$$

Table IX

Wt. per cu. in.	K	M	C	Wt. per cu. in.	K	M	C	Wt. per cu. in.	K	M	C
.096	.2494	.0831	.0277	.250	.6495	.2165	.0722	.410	1.0652	.3551	.1184
.100	.2598	.0866	.0289	.260	.6755	.2252	.0751	.420	1.0912	.3637	.1212
.110	.2858	.0953	.0318	.270	.7015	2338	.0779	.430	1.1172	.3724	.1241
.120	.3118	.1039	.0346	.280	.7275	.2425	.0808	.440	1.1432	.3811	.1270
.130	.3378	.1126	.0375	.290	.7534	.2512	.0837	.450	1.1691	.3897	.1299
.140	.3637	.1212	.0404	.300	.7794	.2598	.0866	.460	1.1951	.3984	.1328
.150	.3897	.1299	.0433	.310	.8054	.2685	.0895	.470	1.2211	.4070	.1357
.160	.4157	.1386	.0462	.320	.8314	.2771	.0924	.480	1.2471	.4157	.1386
.170	.4417	.1472	.0491	.330	.8574	.2858	.0953	.490	1.2731	.4244	.1415
.180	.4677	.1550	.0520	.340	.8833	.2944	.0981	.500	1.2990	.4330	.1443
.190	.4936	.1645	.0548	.350	.9093	.3031	.1010	.510	1.3250	.4417	.1472
.200	.5196	.1732	.0577	.360	.9353	.3118	.1039	.520	1.3510	.4503	.1501
.210	.5456	.1819	.0606	.370	.9613	.3204	.1068	.530	1.3770	.4590	.1530
.220	.5716	.1905	.0635	.380	.9873	.3291	.1097	.540	1.4030	.4677	.1559
.230	.5976	.1992	.0664	.390	1.0133	.3378	.1126	.550	1.4289	.4763	.1588
.240	.6235	.2079	.0693	.400	1.0392	.3464	.1155	.560	1.4549	.4850	.1617

Interpolation Table

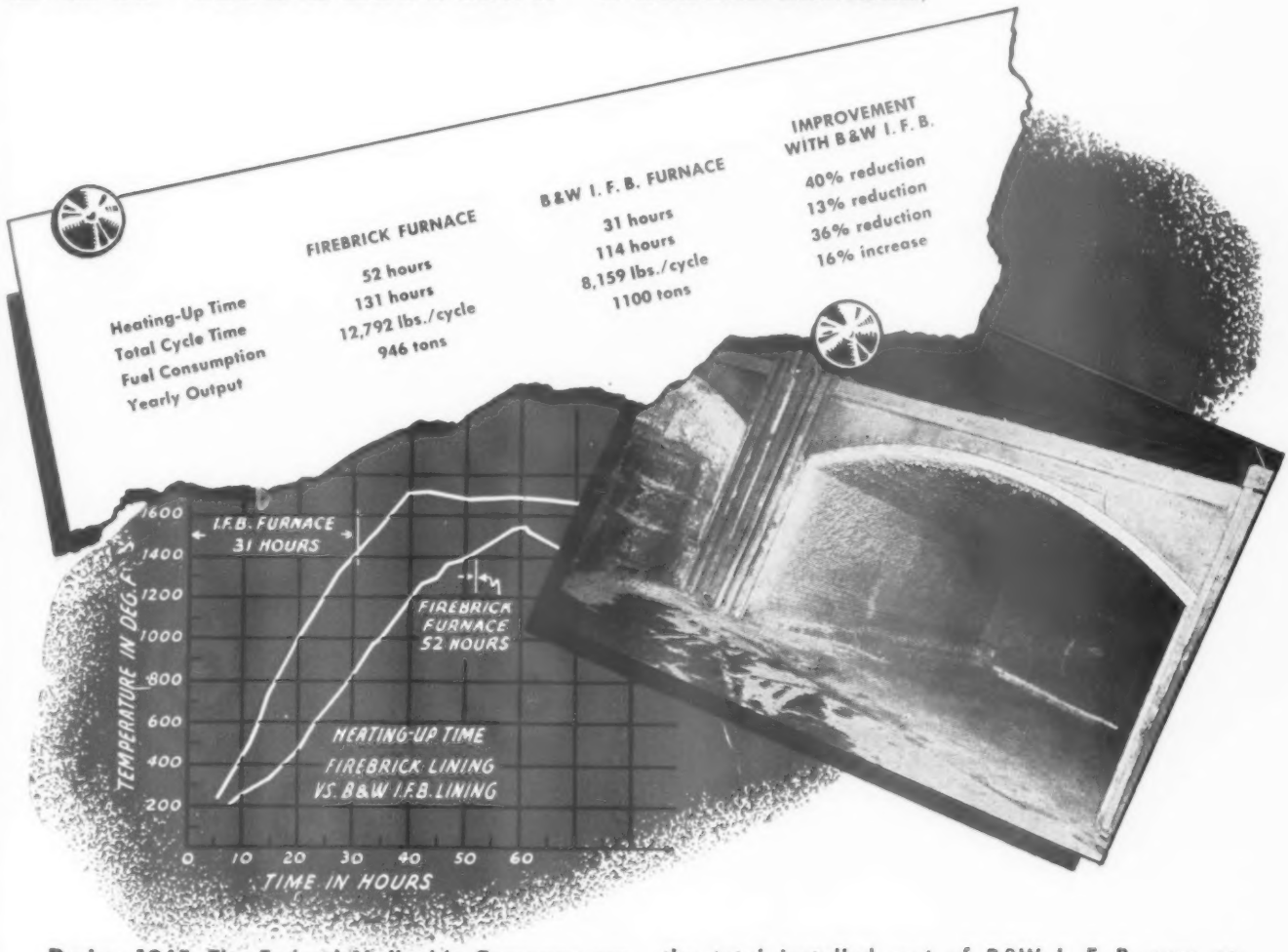
Ad'l wt	Ad'l K	Ad'l M	Ad'l C	Ad'l wt.	Ad'l K	Ad'l M	Ad'l C	Ad'l wt.	Ad'l K	Ad'l M	Ad'l C
.001	.0026	.0009	.0003	.004	.0104	.0035	.0012	.007	.0181	.0060	.0020
.002	.0052	.0017	.0006	.005	.0130	.0043	.0014	.008	.0207	.0069	.0023
.003	.0078	.0026	0009	.006	.0155	.0052	.0017	.009	.0233	.0078	.0026

For method of interpolation, see Table II

(To Be Continued)

Annealing Furnace Tests Show Substantial Savings with

B&W INSULATING FIREBRICK



During 1945, The Federal Malleable Company ran comparative tests to determine the most efficient refractory for their annealing furnaces. Two furnaces, having identical inside dimensions and duplicate conditions of loading and firing, were tested. Regular first-quality firebrick was used in one furnace—B&W Insulating Firebrick in the other.

The above tabulation shows the results of using B&W I. F. B.—reduced heating-up time, less cycle time, lower fuel consumption and increased production. Equally important, Federal Malleable points out that with B&W I. F. B. they can produce better castings, since they can duplicate the firing period by better control. Also significant was the fact that the total installed cost of B&W I. F. B. was no greater than that required for an installation of regular firebrick.

The furnace with B&W I. F. B. has given these same savings during a year of continued production and there has been no maintenance. As a result, The Federal Malleable Company is relining other furnaces with B&W I. F. B.

Throughout the country, B&W Refractory Engineers are helping to guide progressive industries to more profitable production. For more detailed information on how you can increase the efficiency and economy of your furnaces—consult your local B&W Representative.

R-260

B&W

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Activities of Foundry GROUPS

New England

NEW ENGLAND Foundrymen's Association held its regular monthly meeting Oct. 9 at the Engineers' Club, Boston, with 100 members and guests in attendance. A business meeting was held after the dinner, at which R. F. Harrington, Hunt Spiller Mfg. Corp., Boston, reported, as chairman of the pig iron committee, on the work of that group.

Howard J. Williams, general manager, New Jersey Silica Sand Co., Millville, N. J., was a guest speaker, and is well informed on his subject, "Mining and Processing of Molding Sand." Mr. Williams described the preparation of various types of sands, from mining to loading of the finished product in cars. He used a fine collection of slides to supplement his talk, including pictures of the well equipped laboratory which his company maintains. The relationship that such a laboratory has on exact control of chemical and physical properties is well established in the foundry industry, as well as the knowledge that this company is noted for its uniform products and the closeness with which it adheres to specifications.

The speaker brought out the importance of having the most modern equipment available and of its care, from the standpoint of economy as well as production of uniformly graded sands. Examples were shown of trucks, shovels, conveyors, in good condition, and also equipment storage facilities.

A question-and-answer period followed the discussion, in which many of those present took an active part.—*Merton A. Hosmer.*

New Jersey

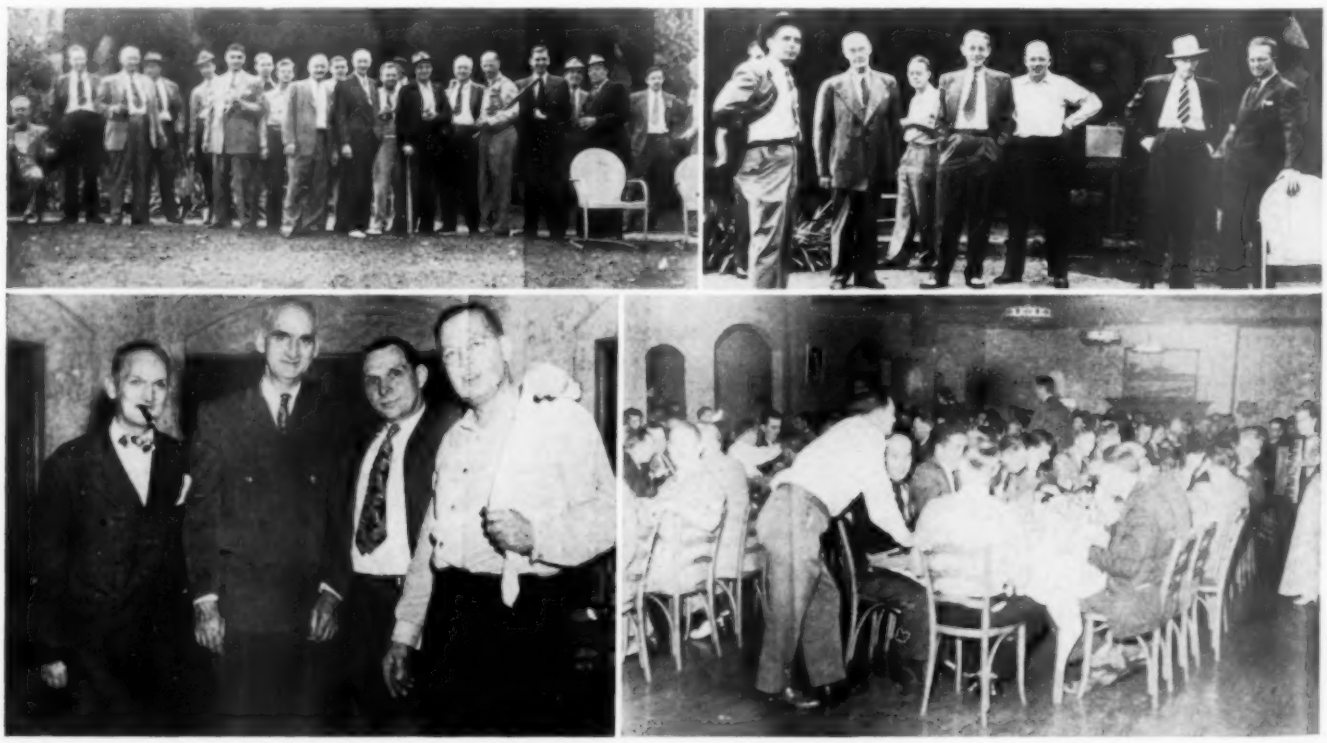
MAX TRAUM, president of Sacks-Barlow Foundries Inc., Newark, N. J., was elected president of the New Jersey Foundrymen's Association at its first fall meeting, Oct. 28, at the Newark Athletic Club. Hubert F. O'Brien, president of A. P. Smith Mfg. Co., East Orange, N. J., was elected vice president. Al W. Laytham, president of Wm. P. Laytham & Sons Co., Paterson, N. J., was added to the board of directors.

J. A. Claussen, chief, Raw Materials Section, Steel Branch, Civilian Production Administration, spoke on "The Foundry Pig Iron Situation." This hot subject attracted a large attendance. Mr. Claussen painted a pretty grim picture of the prospects for ordinary jobbing foundries. There is a very serious shortage of pig iron, due primarily to strikes last spring and to the shortage of scrap, which is unlikely to improve much until the receipt of new equipment in large volume enables owners to scrap old equipment. Premiums for old and new furnaces should increase production by December, but the Housing Administration considers it has a prior claim on this increased production so that only a small part of it may reach jobbing foundries.

Even if greater pig iron production is developed by premium payments, there is grave doubt as to whether enough coke will be available to supply both the additional furnace capacity and the additional foundry capacity resulting from it. There is also danger of a shortage of ore. Mr. Claussen anticipates a serious shortage of foundry coke, particularly by-product coke. Reserves of coke for domestic heating by coke or gas this winter are very low and if they run out, domestic heating will get priority over industrial uses.

In some sections, priority foundries are using 100 per cent pig iron, because it is cheaper to do so, even where scrap is available. Nonpriority foundries will probably have difficulty in getting an ade-

(*Continued on page* 172)



CENTRAL OHIO: Views of members of Central Ohio Chapter, AFA, at their second annual outing at Brookside Country Club, Sept. 13. (Photos by Wilfred N. White, Jackson Iron & Steel Co., Jackson, O.)

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MOGUL
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CORN PRODUCTS REFINING CO., NEW YORK, U.S.A.
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MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.
MOGUL works with core oil because it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or rosin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.
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KORDEK is a perfect DRY BOND. It can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.
CORN PRODUCTS SALES CO.
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(*Continued from page* 170)

quate supply of pig iron for several months.

Foundrymen here feel that CPA is doing the best it can in the face of arbitrary mandates from Congress and Housing and the OES.

H. L. Edinger, president of the Gray Iron Founders' Society last year, gave a brief report of the society's annual meeting at Cincinnati on Oct. 22-23, and A. E. Winstead reported on his visits to several Cincinnati foundries.—*Ben K. Price.*

Chicago

CHICAGO Chapter of the AFA held its first roundtable of the 1946-47 season at its regular monthly dinner meeting, Nov. 4. The attendance of close to 190 which gathered at the Chicago Bar Association dining room was proof that group type meetings have lost none of their attraction in the immediate postwar period.

Chapter Chairman L. H. Hahn, metallurgical supervisor, Sivyer Steel Casting Co., Chicago, presided at the dinner and introduced the speakers and chairmen for the roundtables.

"Control of Carbon in the Cupola" was the topic for the Gray Iron session of which Leonard A. Colangelo, foundry metallurgist, Tractor Works, International Harvester Co., was chairman. Joint speakers were John H. Gellert, vice president, Nichol-Straight Foundry Co., and H. Kenneth Briggs, metallurgist, Miller & Co.

Malleable division devoted its attention to "Gates & Risers," with Kenny P. Smith, foreman, Chicago Malleable Castings Co., as speaker, and Cecil Semrau, metallurgist, Illinois Malleable Iron Co., as chairman.

Oscar Blohm, chief metallurgist, Hills-McCanna Co., spoke to the nonferrous division on "Magnesium." H. E. Ferguson, sales engineer, Acme Aluminum Foundry Co., presided.

The Steel division roundtable heard C. F. Christopher, in charge of steelmaking practice, Continental Foundry & Machine Co., East Chicago, Ind., discuss "Mechanism of Stress Formations in Steel." F. S. Sutherland, plant metallurgist for the same company, presided. Mr. Christopher confined his attention to the mechanical aspects of solidification, and in so doing introduced new thinking into an old subject.—*Erle F. Ross.*

Cincinnati

APPROXIMATELY 170 members of the Cincinnati District Chapter, AFA, visited the Cincinnati Milling Machine Co., Oct. 14. This is one of the most modern foundries in the country and the members were given the opportunity to see it in operation. The meeting started promptly at 3 p.m. and after seeing the plant, the visitors were served T-bone steak dinners. After dinner colored movies of plant operations were shown. This meeting was of general interest to all the members and everyone thought the time well spent.

It was one of our best attended meetings because everyone probably wanted to take advantage of Cincinnati Milling's hospitality, which was of such order as to have city busses to transport the members from the foundry to the office. The company deserves congratulations on their

(*Continued on page* 174)

SAGINAW VALLEY: National Officers' Night was held Oct. 3 at the season's opening meeting for Saginaw Valley Chapter, AFA. Max Kuniansky, national vice president, and Herbert Scobie, educational director, were guests

NO MARGIN FOR ERROR!

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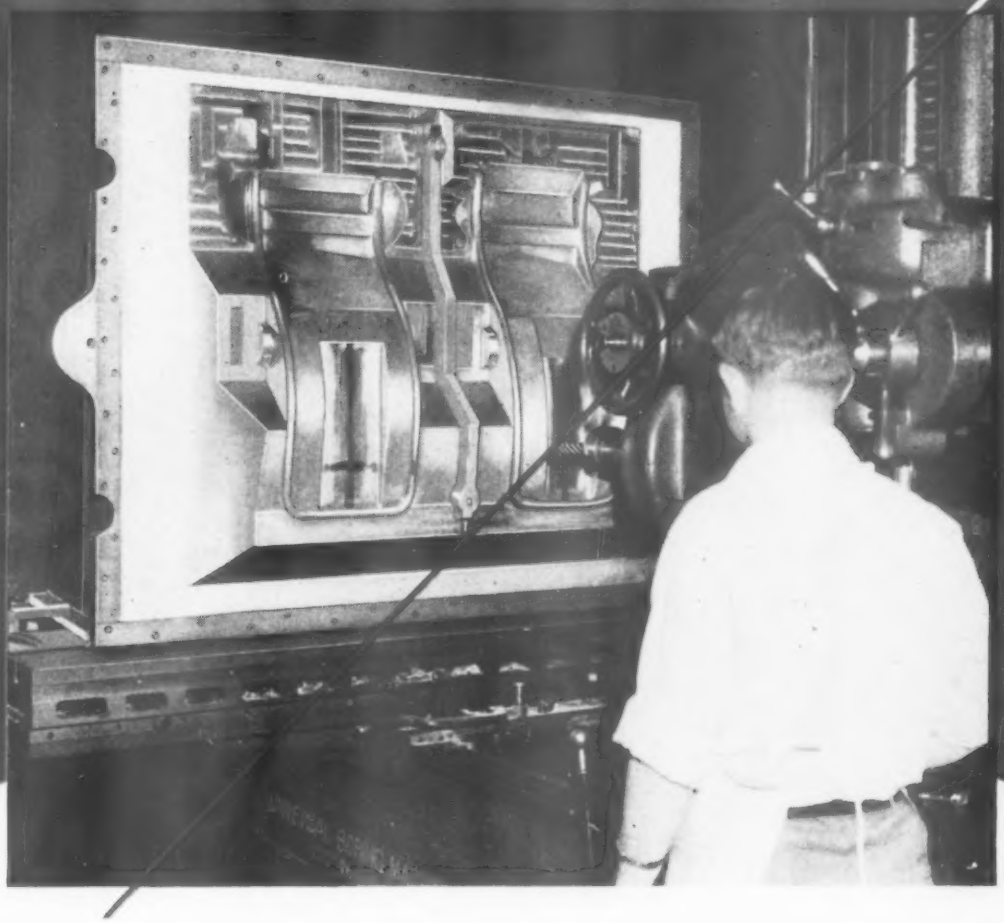

Accuracy! The Hallmark of every Buffalo Precision pattern. That's why this big pattern pictured above will soon be producing low-cost castings in volume, with a minimum of scrap, for a leading manufacturer.

Accuracy—as the Buffalo Pattern Works knows it—includes a knowledge of metals, structural design, and practical fabrication. Put Buffalo's fifty-four years' experience to work on your next pattern. Write, wire or phone.

BUFFALO PATTERN WORKS

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(*Continued from page* 172)

plant and the way it is run.—*E. F. Kindinger, secretary.*

Eastern Canada and Newfoundland

EASTERN Canada and Newfoundland Chapter of the AFA inaugurated its 1946-47 monthly meetings, Oct. 11, at the Mount Royal Hotel, Montreal, with 165 members and guests in attendance. The new chairman of the chapter, Henry Louette, called upon G. Ewing Tait, chairman of the educational committee, for a brief resume of the season's plans. This committee is conducting close contact with the staff of Montreal Technical School, where the enrollment in the second and third year foundry classes is most encouraging. The committee is stressing the importance of training young men for supervisory positions, instead of devoting all of the training to molding.

B. Stott of the membership committee reported that over 40 new members had been obtained, bringing the membership total to 332, which is a new record. The committee is aiming for a minimum of 350 members.

Mr. Louette was profuse in his praise of the Prince Edward Island organizing committee for its splendid job on the recent Charlottetown regional meeting. The attending members were pleased with the technical meeting and plant visitation which had been arranged, as well as the hospitality extended to them by their hosts.

S. C. Massari, technical director, American Foundrymen's Association, was the guest speaker, and in his discussion of

(*Continued on page* 176)

MICHIANA: Some of the members and guests of Michiana Chapter, AFA, who participated in the group's picnic held at Christiana Country Club, Elkhart, Ind., Sept. 21. (Photos by R. E. Schalliol, American Foundry Equipment Co., Mishawaka, Ind.)

when the Bells of Christmas ring....

Faith is renewed in the hearts of men. It may be faith in your family, in your friends, or even in your business associates. For in this joyous season of the year, especially, men feel that they can trust the people with whom they have dealt and will deal in the future.

Hope soars again in the minds of men. They look to the future with silent vows of higher endeavors in their everyday living. And Milwaukee Foundry Equipment Co. agrees with these hopes and strives to meet them.

Charity evolves in the actions of men. Each tries to do something to help his fellow man in some small, yet meaningful, way. Here, too, Milwaukee Foundry Equipment Co. joins in this threefold Christmas spirit with the determination to aid men in their productive efforts.

And with these God-granted legacies of Faith, Hope and Charity, a better life is built on earth...when the Bells of Christmas ring.

Milwaukee Foundry Equipment Co.

C. M. Byerlein
E. Howard Lundgren
John C. Miller
Samuel P. George
O. H. Weiss
W. W. Eichenberger
E. A. Barch
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(*Continued from page* 174)

"Cupola Operation," pointed out the importance of this type of melting equipment and its versatility, mentioning that it is used also to melt nonferrous metals. Mr. Massari stressed the importance of control in melting and accurate knowledge of what is taking place in the cupola. Slides were used to illustrate various principles of air volume measuring devices. The speaker stated that the most modest foundry can install a pitot tube in its wind line and get an accurate measure of the volume of air being used. It does not have to be in cubic feet but can be expressed as a manometer reading. Once this reading has been established for most efficient operation, it is not difficult to duplicate the condition constantly, thereby eliminating one more variable in operation.

Consistency of operation was emphasized and after the most efficient melting practice has been established, it should be adhered to. One should not attempt to reduce the melting rate by any other method except lining down the cupola to a smaller diameter and duplicating the practice established with the larger size. Mr. Massari showed interesting experimental figures, giving the relation existing between loss of silicon and manganese vs coke ratio, and the per cent of CO and CO_2 in stack gas vs coke ratio.

The speaker mentioned the importance of proper selection of refractories for lining the cupola, and stated they should be of one type, from bottom to top. It is more economical to use a high grade refractory cement instead of a fire clay mud, in laying the bricks, as the weakest part of the walls are the joints. Also, these joints should be as thin as possible. The fact was mentioned that precast or formed tap holes and slag hole blocks are better than built-up ones.

With reference to blast preheating, this equipment is economical to use only when the cupola is operated continuously for a long period of time, due to the fact it takes several hours for equilibrium to be established.

In his discussion of tuyeres, Mr. Massari said he knows of no method to show that multiple tuyeres are better than single rows. As to size, these must be large enough to offer the least amount of resistance to the air blast and distribute the air evenly to all parts of the circumference, but they must be kept absolutely clean. The advantage of a valve on each tuyere is that the tuyeres can be shut off for a short time. The heat will melt off the slag and so help in keeping constant conditions in the cupola.

The speaker gave extensive information on his subject in the short time available. —*Robert Lepine.*

Detroit

ONE of the largest crowds in chapter history was on hand for the Oct. 17 meeting of the Detroit Chapter of the AFA at the Rackham Memorial, to hear a triple-feature program starring Ralph L. Lee, employee co-operation staff, General Motors Corp. The program opened with about 150 seated in the building's auditorium, the first presentation being a short moving picture entitled "The Experiment" in which Doc Lee and a co-worker, H. G. Weaver of the GM customer research staff, portrayed the principal roles.

Mr. Lee followed with one of his usual forceful, dramatic and amusing presentations of human foibles bearing on labor-management relationships, and the importance of man-to-man considerations in the conduct of a business.

H. T. Gierok of the GM labor relations staff concluded with a most interesting analysis of grievance procedures throughout the corporation's plants. He traced the path of a typical grievance up through the supervisory ranks to final disposition by an impartial umpire, and emphasized the importance of prompt and fair action early in the game, before a grievance assumes major proportions.

A lively question-and-answer period held the attention of the full audience for an hour after the conclusion of the formal portion of the program.—*C. J. Rittinger, chapter reporter.*

NATIONAL OFFICERS' NIGHT meeting of Southern California Chapter, AFA, had as guests S. V. Wood, national president, and W. W. Maloney, secretary-treasurer. Shown left to right are: George K. Dreher, Rogers Pattern & Foundry Co., an AFA director; Robert Gregg, Reliance Regulator Co.; Mr. Wood and Mr. Maloney

Saginaw Valley

THE Saginaw Valley Chapter of the AFA held its first meeting of the 1946-47 season at Fischer's Hotel, Frankenmuth, Mich., Oct. 3.

This meeting had been designated as National Officers' Night. The chapter was honored by the presence of Max Kuniansky, national vice president, and Herbert Scobie, national educational director, both of whom spoke to the group about the educational program which is a major project of AFA.

The main speaker of the evening was Bruce L. Simpson, National Engineering Co., Chicago. His subject was "The History and Development of the Foundry Industry."

Beginning with the first metals (copper and gold) to be worked by man as early as 8,000 B.C., Mr. Simpson told an interesting story of progress in metals from the days of the Greeks and Romans down through the Renaissance period.

In the course of his illustrated lecture, the speaker traced the foundry industry from several thousand B.C. to the beginning of the twentieth century, pointing out in particular the development of equipment.

Mr. Simpson is the author of a book dealing with the same subject as the lecture, and soon to be published by the AFA.—*Joseph J. Clark, reporter.*

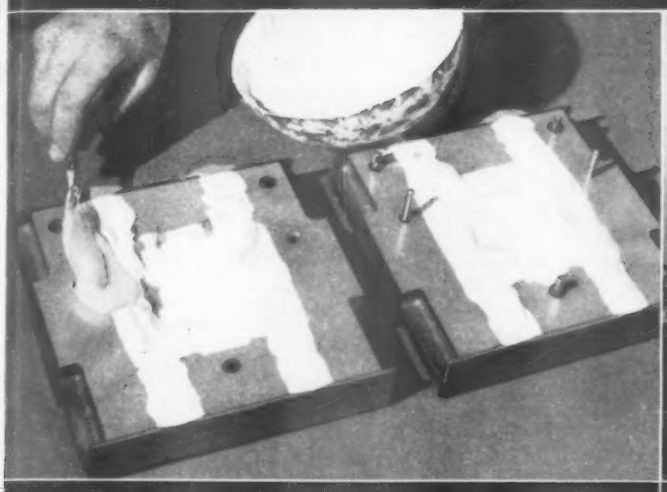
Central Ohio

FIRST technical meeting of the season for Central Ohio Chapter, AFA, held Oct. 28, was a success in size of attendance and interest. The technical talk was "Corercom Practice," by L. P. Robinson, Werner G. Smith Co., Cleveland. Mr. Robinson pointed out incorrect coreroom practices and accused foundrymen of poor practices and negligence. His talk made an impression without arousing antagonism.

He advocated the use of good sand as

(*Continued on page* 178)

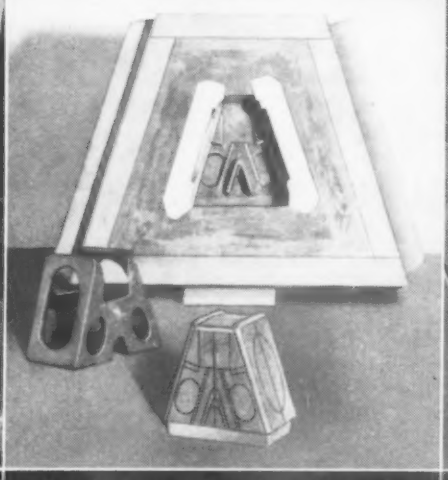
How HYDROCAL Helps Patternmakers



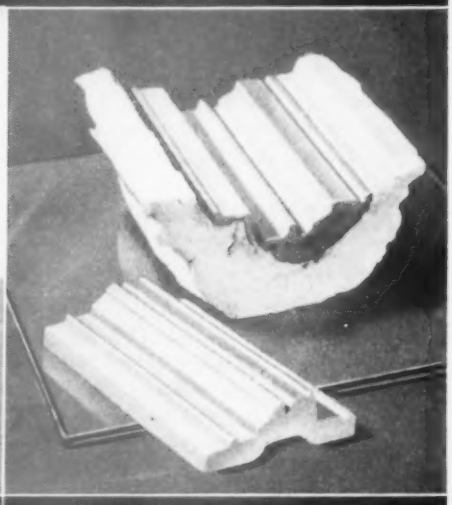
Hydrocal * is ideal for the "booking" method which simplifies checking a core box having no port of entry.

Dimensionally stable, non-warping Hydrocal pattern stock (of predetermined thickness) fabricates easily, quickly.

Template-formed Hydrocal shapes can be combined and blended to make master patterns rapidly and accurately.



In making cores and core boxes, Hydrocal eliminates many templates, assures perfect match between core print and box.



Hydrocal follow boards are accurate, easily and quickly made, provide needed support for thin patterns.

ONE or more of these modern methods shown above can help you in your pattern shop now!

First, send for bulletins describing and illustrating uses of Hydrocal . . . *learn* about these super-strength gypsum cements.

Then *try* this versatile material on your jobs and *prove* to yourself how it performs.

*Hydrocal is a trademark Reg. U. S. Pat. Off. for a super-strength Gypsum Cement manufactured by United States Gypsum Company.

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BULLETINS

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Gentlemen: Please send me copies of your latest bulletins as checked below.

- ☐ IGL-103, How to Make Pattern Stock with Hydrocal
- ☐ IGL-104, How to Check a Core Box with Hydrocal
- ☐ IGL-105, How to Make a Hydrocal Follow Board
- ☐ IGL-106, Hydrocal Combined and Blended Shapes
- ☐ IGL-107, How to Make a Core Box with Hydrocal

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United States Gypsum

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Gypsum • Lime • Steel • Insulation • Roofing • Paint

(*Continued from page* 176)

a base, rather than poor sand with excessive binders. The fewer scrap castings resulting will more than pay for additional costs. Often, too much binder is used, resulting in sticky sands of low flowability and formation of excessive gas.

To obtain proper core sand mixtures, all materials should be weighed, and the mixing should be done by responsible and experienced individuals. He stressed the importance of proper total mixing time for the type of mixer used, dry mixing time and the sequence in which binders are added.

Moisture content of the coresand mix is controlled best by using dried sand as a base. Sticking of sand in core boxes and splitting and cracking of cores during baking results from high moisture content, according to Mr. Robinson.

Too often the core-oil manufacturer's optimum baking temperature and baking time recommendations are disregarded and thermometers and controls on core ovens frequently become inaccurate through lack of attention. Mr. Robinson said that recirculating-type heaters used with properly constructed ovens will improve baking operations. Running heavier cores twice through continuous ovens designed for lighter cores will result in nonuniform baking.

Mr. Robinson concluded by urging close inspection of cores, pointing out it is cheaper to scrap a defective core than to scrap a casting.—*Dan E. Krause, chapter reporter.*

Philadelphia

PHILADELPHIA Chapter AFA's opening night, Oct. 11, at the Engineers' Club, was encouraging to the chapter officers, as over 200 members and guests attended. Fred Liederback, Olney Foundry Division, Link-Belt Co., Philadelphia, acted as technical chairman, introducing E. H. Schleede, development engineer, U. S. Gypsum Co., Chicago, who presented a paper on plaster patterns. The subject was of great interest to foundrymen present because most of them are feeling the pinch of shortages in generally used pattern materials.

Mr. Schleede used slides to illustrate his explanation of the development of gypsum plaster patterns. He has addressed many of the AFA chapters on this subject and his talk was followed by many questions from the audience. The importance of using the correct type of plaster for the particular job was stressed as were the methods of making basic patterns and assembly to produce the completed pattern.

A bit of diversion was furnished by W. W. Thawley in the presentation of colored motion pictures and slides of the Chapter's June Outing. Members present had the opportunity of seeing themselves in action at golf, quoits and soft ball.—*H. V. Witherington, publicity chairman.*

Wisconsin

AT the dinner meeting held Nov. 8 by the Wisconsin Chapter of the AFA, at Hotel Schroeder, Milwaukee, the program differed from any held by that organization in many months. No discussions on foundry subjects were held; instead, after the only announcement of the evening—the admission of 21 new members during the past month—the speaker of the evening was introduced. He was William H. Stevenson, president of the W. H. Stevenson Co., Chicago, and his subject had nothing

(*Continued on page* 180)

CANADIAN FOUNDRYMEN HOLD MARITIME REGIONAL CONVENTION

EASTERN Canada and Newfoundland Chapter of the AFA held its second Maritime Regional Convention Sept. 27-28, at Charlottetown Hotel, Charlottetown, Price Edward Island, under the chairmanship of W. J. Brown, the Robert W. Bartram Co. Ltd., Montreal.

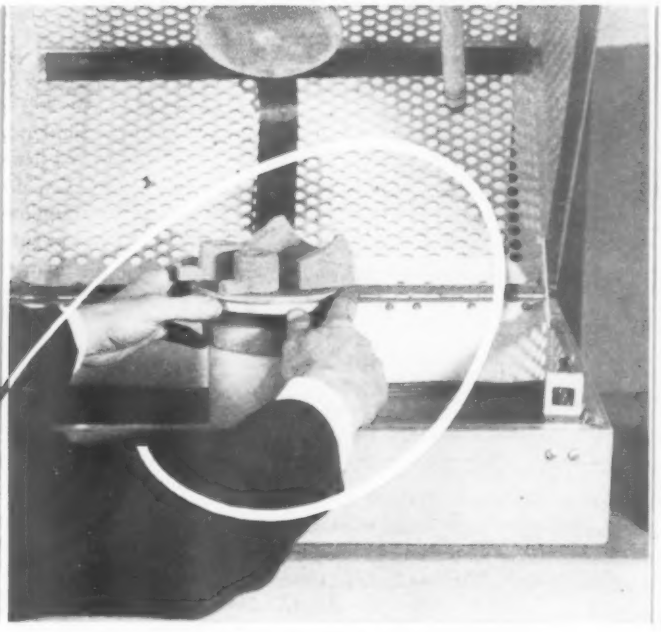
Henry Louette, chapter chairman, introduced Col. C. L. Mackay, Bruce Stewart Foundry Ltd., Charlottetown, who welcomed the delegates to the island. Technical sessions followed the opening address. Harold J. Roast, vice president, Canadian Bronze Co. Ltd., and owner of Roast Laboratories, Montreal, discussed "Brass and Bronze Foundry Practice." E. N. Delahunt, a former chairman of the chapter, spoke on "Cupola Operation." Other speakers included Irvin C. Sheppard, the Beach Foundry Co., Ottawa, Ont., whose subject was "Production of Cast Iron for Stove Plate," and William Bradley, Dominion Engineering Works, Lachine, Que., who discussed "Gating and Heading of Castings."

Discussion leaders for the various sessions were as follows: A. E. Cartwright, Canadian Foundry Supplies & Equipment, Montreal; Norman Macphee, Department of Mines and Resources, Physical Metallurgy Research Laboratories, Ottawa; and George Beaton, Dominion Steel & Coal, Sydney, N. S. —*Claude Bourassa.*

CONVENTION DELEGATES: Ontario and Quebec delegates photographed in Montreal station prior to leaving for the Maritime Regional Convention held in Charlottetown, P.E.I., Sept. 27-28, by the Eastern Canada and Newfoundland Chapter, AFA

AQUA SET

THE SYNTHETIC RESIN BINDER



Core baking speeds, new to the Foundry Industry

When dielectric heat is the baking medium and Aqua-set is the core binder, cores can be brought to a "cured" condition in a matter of seconds. The illustration shows cores being placed for such an application of radio frequency energy in a one position unit. Other methods involve moving the cores on a belt between two extended electrodes.

Heat from this source is generated in the core itself and the action is fast with Aqua-set because Aqua-set is not an oxidizing binder but cures to a finished bond on heating. While dielectric heat is the fastest to apply, Aqua-set cores will bake completely with infra-red rays or conventional ovens can be used with a time saving up to one half that required for Linseed base binders. These are good practical reasons why you should put Aqua-set to work in your foundry.

United Oil Mfg. Co.

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BIRMINGHAM CHAPTER

Plans Annual Conference for Feb. 20-21

BIRMINGHAM District Chapter of the AFA is making plans for its 15th Annual Foundry Practice Conference, the meeting being scheduled for Thursday and Friday, Feb. 20-21 at Birmingham. Technical sessions will be held all day Thursday and Friday afternoon at the Tutwiler Hotel, which will be headquarters for the conference, while Friday morning will be given over to plant visitations. Other plant inspections are scheduled for Saturday. The annual banquet will be held Friday evening, with an entertainment program planned for Thursday evening.

The tentative program for the conference follows:

Thursday morning, Feb. 20

9:00 Registration, Tutwiler Hotel lobby

10:30—Symposium on "Nonferrous Foundry Practice." Symposium chairman — C. K. Donoho, metallurgist, American Cast Iron Pipe Co., Birmingham.

Afternoon

12:30—Luncheon. "American Foundryman's Association," by S. P. Wood, president and general manager, Minneapolis Electric Steel Castings Co., Minneapolis. W. E. Jones, chief engineer, Stockham Pipe Fittings Co., Birmingham, presiding.

2:30—"Precision Castings," by A. H. Homberger, manager, Precision Castings Division, Michigan Steel Castings Co., Detroit. J. A. Bowers, superintendent of melting, American Cast Iron Pipe Co., Birmingham, is chairman.

4:00—"Foundry Sands," by T. W. Curry, cast metallurgist, Lynchburg Foundry Co., Lynchburg, Va. J. E. Getzen, H. G. Mouat Co., Birmingham, is chairman.

Evening

8:00—Entertainment. J. M. Bates, Moore, Handley Hardware Co., Birmingham, and entertainment committee chairman, presiding.

Friday morning, Feb. 21

9:00—Plant visitations.

Afternoon

2:00—"Some Alloy Irons for Wear and Corrosion Resistance," by F. G. Sefing, development research division, International Nickel Co., New York.

3:30—"Cupola Melting of Gray Iron," by W. B. McFerrin, Electro Metallurgical Co., Detroit. Ned Brandler, Electro Metallurgical Co., Birmingham, chairman.

Evening

7:00—Annual banquet. "Birmingham's Future in Industry," by J. L. Brakefield, secretary, Birmingham Chamber of Commerce. T. H. Benners Jr., president, T. H. Benners & Co., Birmingham, presiding.

Saturday morning, Feb. 22

9:00—Plant visitations.

(*Continued from page* 178)

to do with foundry operation. It was "One Hundred and Ninety Billion Dollars," this title representing the approximate amount of money in the United States at this time.

Mr. Stevenson explained the difference between bank deposits and money in circulation; why our money supply has varied the last 26 years; what caused its rise to this large figure today; how our money originates; how it is cancelled and the effects on business of the inflation and deflation of money.

"The banks of the U. S. have four major functions," Mr. Stevenson said. "They are the custodians of our money supply; the clearing agents of our exchange; the creators of our money and the guardians of value of our money. The vast sums borrowed by our government from the banks have made it possible for bankers to guard the value of money. All the security that lies behind the bank deposits created by government borrowing is the government's promise to tax."

Mr. Stevenson declared that the greatest single problem in paying the national debt is the fact that every dollar paid the banks will be cancelled from existence. "Our entire financial structure is rigged to the public debt," the speaker said. "Our hope for the future lies in a broad knowledge of economic facts. Knowledge of these facts will point the way to solutions of our problems. Every leader of business should seek and support economic education."

Despite the nontechnical nature of the talk the audience showed the same interest that is displayed when a foundry technician speaks to this group, and many questions were asked regarding the points brought out by Mr. Stevenson.—*John E. Hubel.*

Central New York

CENTRAL New York Chapter, AFA, had a dinner meeting at the Onondaga Hotel, Syracuse, N. Y., Oct. 11, and 120 members and guests heard Prof. J. Jeffrey, Cornell University, continue his talks on "Metallurgy" and answer questions presented by the discussion leaders of the Elmira meeting in September.

Prof. Jeffrey selected the equilibrium diagram as his topic and described its use in gray and malleable iron and several nonferrous alloys. He showed two motion pictures illustrating the action of molten iron entering and filling the mold cavity, using several different types of gating and risering.

Following the talk, the meeting divided into three groups for round-table discussions. Louis Iadarola, until recently shop practice engineer, Malleable Founders' Society, led the malleable iron group; C. M. Fletcher, Fairbanks Co., Binghamton, N. Y., led the nonferrous section and L. D. Wright, general manager, U. S. Radiator Corp., Geneva, N. Y., handled the gray iron discussion. Questions arising from these groups will be answered at a future meeting.

Mr. Fletcher, chapter secretary, passed around cards at the September and October meetings to obtain the accumulated one-way mileage traveled by those present to attend each meeting. The 10,700 miles traveled by 235 persons to the two meetings is considered a good indication of the members' interest in chapter activities.—*J. A. Feola, publicity chairman.*

Ontario

FOUNDRY Sand Practice" was the subject of the address by C. A. Sanders, American Colloid Co., at the first meeting of Ontario Chapter of the AFA, for the 1946-47 season, held in Hamilton, Sept. 20. The chapter's activities got off to a good start under the guidance of Chairman J. A. Wotherspoon, Imperial Iron Corp., St. Catharines, with about 135 members and guests in attendance.

The speaker, who was introduced by R. A. Woods, Geo. F. Pettinos (Canada) Ltd., pointed out that a simple recipe will not meet the diverse sand requirements of all types of foundries. He cited as an example a foundry in the United States that installed a fine mechanized setup planning to use natural sands, but had synthetic sand advocated as a cure-all. Actually when natural sands are controlled as closely as synthetic sands good results are often obtained in applications that are normally considered to favor the latter.

Synthetic sands are unsurpassed for flowability and rapid production. Natural sands give high hot strength and meet certain other requirements of a large number of casting jobs. Certain basic properties of the sand are of the greatest importance in determining the success or failure of either synthetic or natural sands. These include grain distribution, density and moisture content.

It is becoming more and more important to utilize up-to-date methods of foundry sand control as foundries become more mechanized. Proper sand control will give the foundry the information which it needs in regard to moisture content of the sand and its grain distribution. Laboratory methods will not be quite so successful in determining the actual density of the sand in the mold and yet information obtained by these methods may indicate whether the foundry will get good castings or run into the washes and cuts associated with low sand density or into the porous metal that may result from too high den-

(*Continued on page* 182)

THE IMPROVED Redford CORE BLOWER

CARTRIDGE BENCH TYPE

Users report remarkable increases in quality and quantity of production.

When making cores from horizontally split boxes, the work of placing driers and drawing the box is done on the base of the machine

Produces variety of intricate cores with unusual speed and simplicity.

Comes ready to use—virtually no installation cost.

Can be operated with unskilled labor—extremely easy to use.

If you make cores 2 lbs. or under—this unit ideally suited to your use.

Designed by practical foundrymen.

WRITE for
complete details and new booklet.

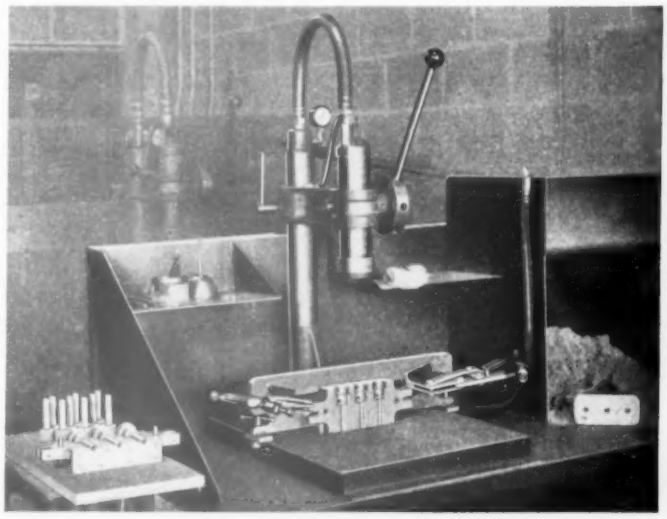
FILLS NEED FOR SIMPLE, FLEXIBLE CORE BLOWER

The New *Redford Bench Core Blower* has met with enthusiastic acceptance by foundrymen because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 9 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in eight additional standard sizes and special sizes furnished where needed.

If you have any Core Blowing Problems write or call our Engineering Department. We will change your present equipment for blowing or assist you in designing proper equipment.



The Core Box Clamping Attachment is used when blowing split core boxes vertically (on end). It is quickly adjustable to permit use of different size core boxes. Changeover requires only a few minutes

Redford IRON & EQUIPMENT CO.

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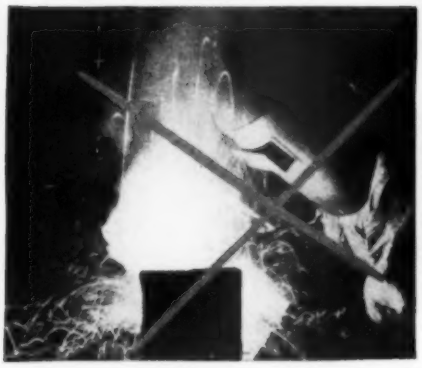
Why the RUEMELIN FUME COLLECTOR *is a* REAL NECESSITY

● *THE OLD WAY*



● *THE NEW WAY*

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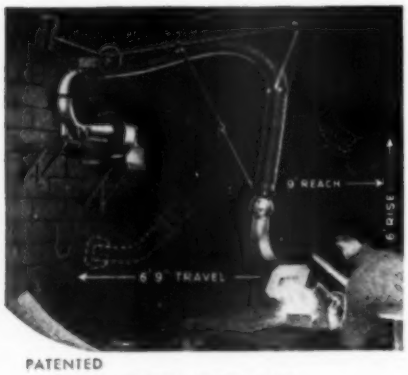

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TWO MODELS!

- Long reach Model D-5342 — ideal for large welding booths; reaches out 15 feet from wall.
- Standard Model D-5310—used for standard welding booth ventilation; hood reaches out 9 feet from wall.

The Ruemelin Welding Fume Collector has been specially engineered to eliminate noxious fumes. The inlet hood maintains a constant high velocity over the working area, quickly removing heat and smoke *at the source.* Welders equipped with this device are assured of a clean shop atmosphere; the manufacturer gains by increased daily production.

The fume collector hood can be instantly placed where needed anywhere in the booth welding area. No tedious adjustment necessary. Just pull the inlet hood to the welding position and you are ready to go. Approved by state industrial commissions and by compensation insurance companies. Many users send in repeat orders. Write for bulletin 37-C today.

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Manufacturers and Engineers of Sand Blast and Dust Collecting Equipment

(*Continued from page* 180)

sity.

Sand expansion troubles may often be traced back to improper grain distribution, although moisture causes more trouble than any other single factor in foundry sand. It is often hard to get down to the true basis of casting difficulties. For this reason Mr. Sanders believes it is not generally advisable for the metallurgist to have the job of sand control. The better arrangement is to have a sand control man appointed, but he should be given the necessary authority to enable him to do a good job.

R. T. Robertson, International Harvester Co. of Canada Ltd., Hamilton, announced the foundry course being sponsored at the F. R. Close Technical Institute in Hamilton by Hamilton foundries with the backing of Ontario Chapter. The course will consist principally of classes with a small proportion of shop work and will run one night per week for 24 weeks. The course is specially designed for young foundrymen desiring a better understanding of their trade.—*G. L. White, secretary-treasurer.*

Chesapeake

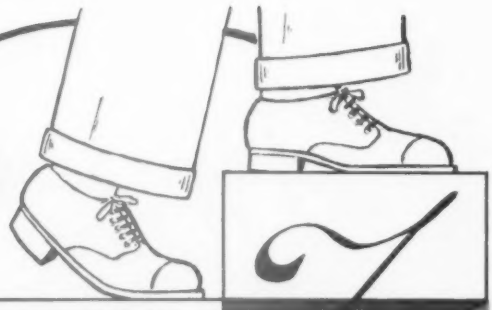
J HOWARD WARE, general sales manager, Redford Iron & Equipment Co., Detroit, spoke on "Core Blowers & Core Sand Mixtures," at the October meeting of the Chesapeake Chapter, AFA. His talk was supplemented by actual operation of a bench-type core blower, sand for which was furnished by C. A. Robeck, Gibson & Kirk Co., Chesapeake Chapter director.

Technical Chairman William H. Holtz, American Brake Shoe Co., introduced the speaker. In his talk, Mr. Ware stated that blowing with the cartridge, bench-type core blower is ideally suited for mass production of plain and intricate cores. Each corebox is an individual problem, since the positioning of the necessary vents, in either wood or metal boxes, directs the flow of sand. Vents are screen of 30-50 mesh or slotted type with the opening .010 to .015 in., the diameter varying from ⅛-in. up. In discussing vents, he said that the position of the vents is determined by the fineness of the sand. Wear on core boxes is caused by improper venting. Several small vents are better than one large one.

Mr. Ware emphasized the importance of preparation and control of core sand mixtures and said that the dry ingredients should be thoroughly mixed before the addition of oil and water, but cautioned against over-mixing thereby causing balling. In conclusion he said that an air-blown core is stronger, coarser in the center than the hand rammed core be-

(*Continued on page* 184)

Definite Steps to Better Castings



MEASURE LIMESTONE .. Accurately

MEASURE COKE .. Accurately

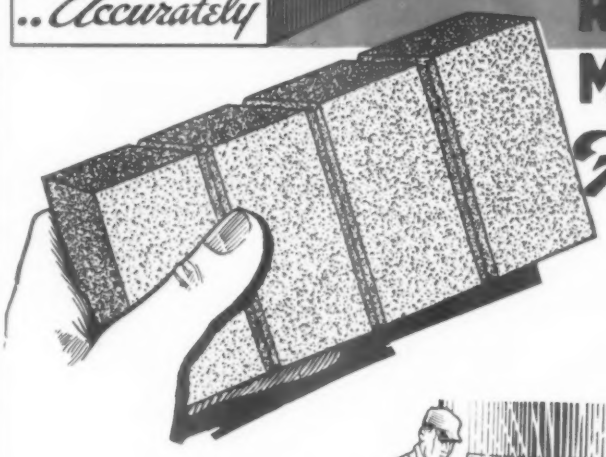
MEASURE SCRAP .. Accurately

MEASURE PIG .. Accurately

then

REMOVE IMPURITIES FROM MOLTEN METAL *with*

Famous CORNELL CUPOLA FLUX



This time-proven metal cleanser works five ways to improve the quality and quantity of your casting production:

(1) Its purging action causes rapid elimination of slag and other impurities from molten metal.

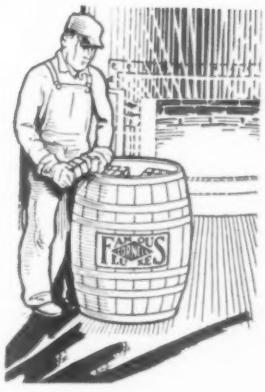
(2) It makes iron hotter and more fluid.

(3) It enables you to pour castings that are denser grained, stronger, cleaner—no chilled sides, nor hollow centers.

(4) It makes machining definitely easier and smoother.

(5) It keeps cupolas clean, protects life of brick in melting zone, insures clean drops, cuts maintenance time and labor.

EXCLUSIVE SCORED BRICK FORM is a real time and labor saver, and promotes accurate measurement — correct quantity of flux per charge. You simply toss in a brick for each ton or break off a briquette (quarter section) for each 500 pound charge of iron. It does not blow out with the blast but stays in melting zone until entirely consumed.



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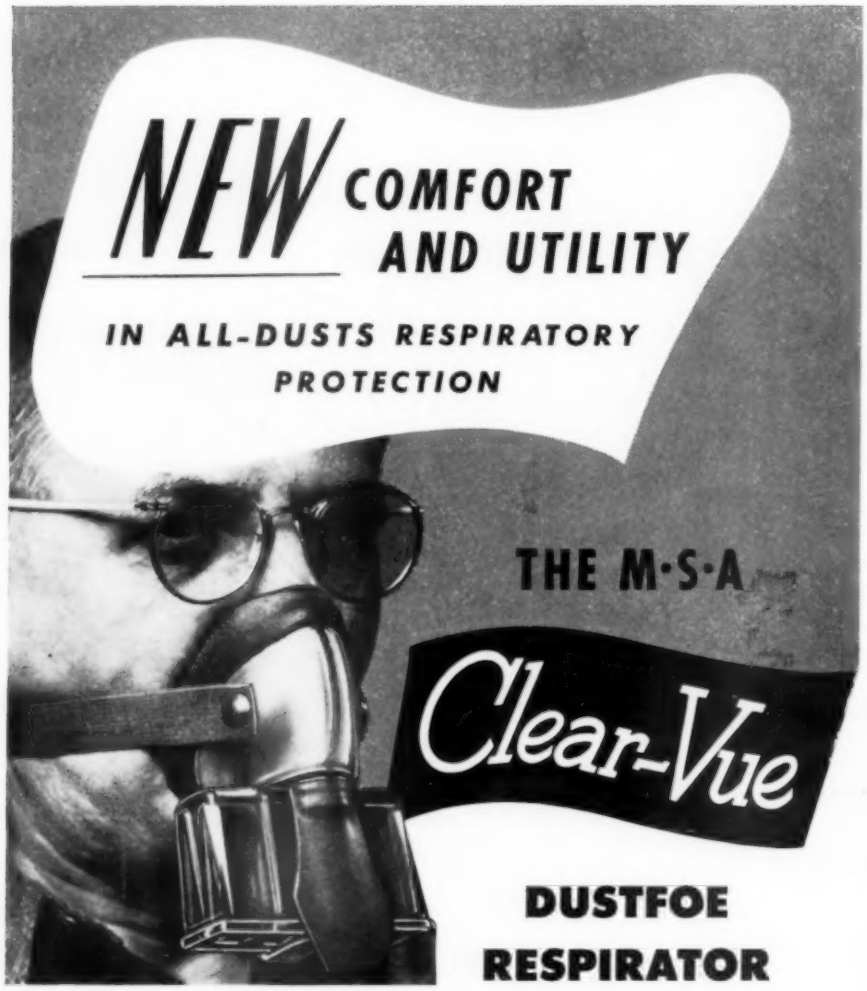
Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.	Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.	Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.



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A leader for years in the field of respiratory protection against nuisance and harmful dusts, today's new Clear-Vue Dustfoe offers even greater comfort and utility! We invite you to see for yourself this forward stride in dust respirator design, and appreciate its even greater worker-acceptability—ask your nearest M. S. A. representative for a prompt demonstration! The New Clear-Vue Dustfoe Bulletin No. CM-7 is now ready: *write for your copy.*

FEATURING

- **BRIGHT ALUMINUM FACEPIECE**—sturdy, lightweight, formable to exactly fit wearer's individual facial contour.
- **TRANSPARENT PLASTIC FILTER CONTAINER**—permits checking filter type, correct position and condition at a glance, without disassembly.
- **LARGE COMFORTABLE FACE CUSHION**—soft, flexible, resilient facepiece cushion assures comfortable dust-tight seal without pressure points. Removable and washable.
- **FINER APPEARANCE**—the combination of bright aluminum facepiece, clear filter container, and light gray headband and exhalation valve make the Dustfoe as good to look at as it is easy to use!

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(*Continued from page* 182)

cause the fine sand grains are blown to the outside or surface of the core.

A prolonged discussion followed his talk.—*J. Arthur Reese, chapter recorder.*

Birmingham

ONE of the largest crowds in the history of the Birmingham Chapter of the AFA turned out Oct. 18 to hear Wally W. Levi, chief metallurgist, Lynchburg Foundry Co., Lynchburg, Va., speak on "Cupola Operations and Control." Ninety-seven attended the dinner honoring Mr. Levi, and 125 attended the technical session. Mr. Levi presented a number of slide-film pictures to illustrate his talk.

T. H. Benners Jr., chapter chairman, served as toastmaster at the dinner and introduced the coffee speaker, Lewis F. Jeffers, president of the Trustees Loan & Discount Co., who gave a most interesting and enlightening talk on "The New Industries Division of the Chamber of Commerce." Mr. Jeffers, a vice president of the Chamber of Commerce, is in charge of its New Industries Division, which is seeking to win new industries for Birmingham. These new businesses will complement those already established here. By Jan. 1, 18 new concerns will have been brought to Birmingham.

W. E. Jones, chief engineer, Stockham Pipe Fittings Co., and vice chairman of the Birmingham Chapter, in charge of programs, introduced Mr. Levi at the technical session. Mr. Levi received his degree in metallurgical engineering from the University of Michigan in 1926 and has been with the Lynchburg Foundry Co. since 1934. Prior to his present connection he was with John Deere Tractor Co. and Union Malleable Co.

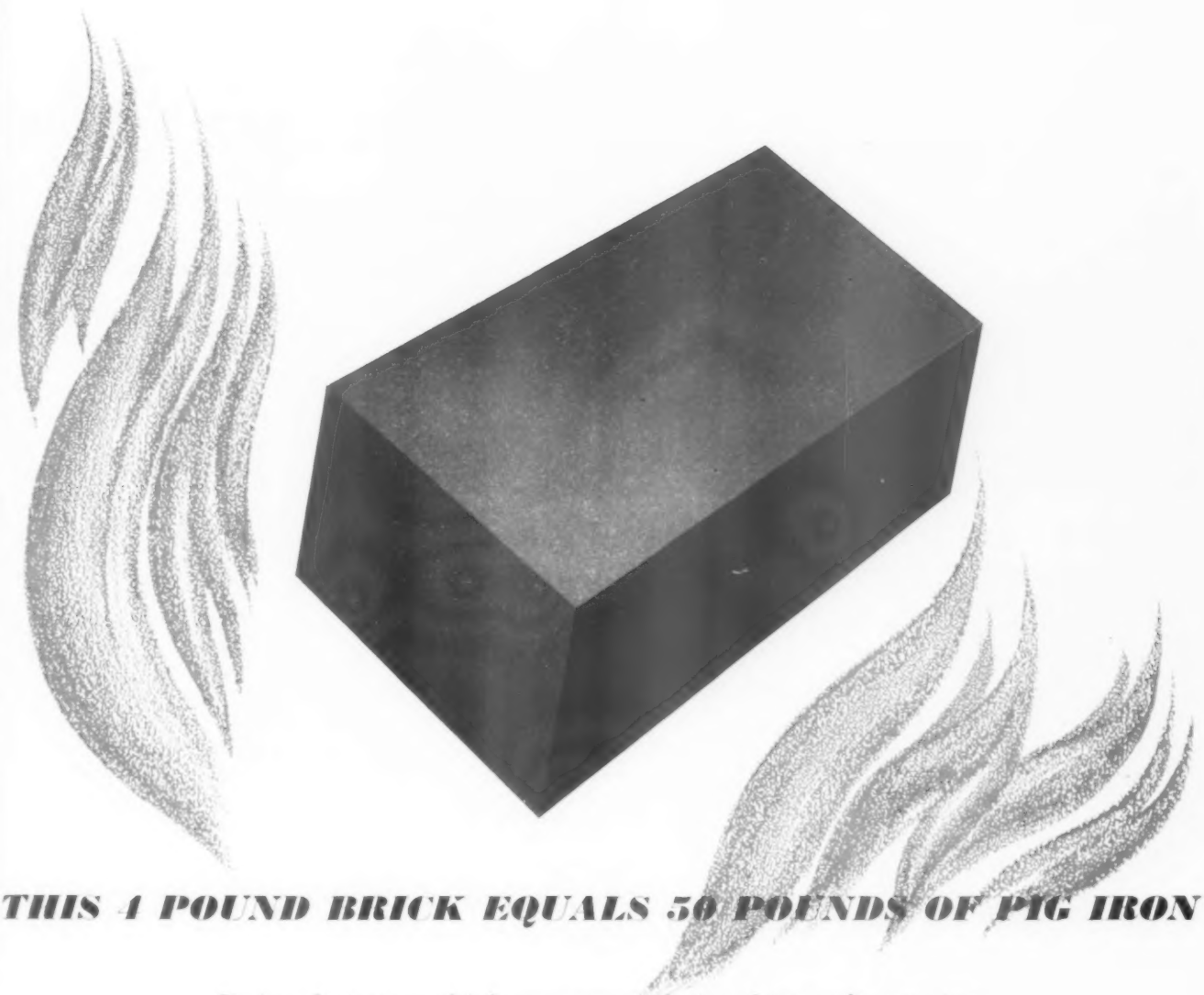
The highlights of Mr. Levi's talk included the following:

1. Exact knowledge of the composition and behavior of the raw materials used is one of the first requirements of successful cupola operation.

2. Carbon control. It is felt that the total carbon present is of extreme importance in its influence on the properties of the finished product. The total carbon content of the iron is of course, influenced by factors such as the percentage of steel scrap and/or pig iron in the charge, the amount and type of coke used, blast pressure, blast temperature, melting rate, tapping technique, melting temperature, auxiliary equipment used in connection with the cupolas, and many others.

3. Coke. All other things being equal, the total carbon in irons melted with by-product coke is lower than that

(*Continued on page* 186)



THIS 4 POUND BRICK EQUALS 50 POUNDS OF PIG IRON

Pig iron shortages needn't hamper your production of top quality grey iron. You can use 100% scrap in your cupola charges and still get uniform carbon content, simply by adding Mexite Briquettes to the charge.

One 4-lb. Mexite Briquette yields as much carbon as 50 lbs. of pig iron. Mexite Briquettes, introduced into the cupola charge, not only are a dependable source of carbon, but they also improve fluidity, cut shrinkage and chill and greatly aid in melting.

And Mexite Briquettes are easy to use. For 100% scrap charges, add 20 Briquettes on the bottom doors and include 10 or more per ton of charge, depending on the type and nature of the scrap and the analysis desired. Even when pig iron is used, it still pays to add 2 to 5 Mexite Briquettes to stabilize carbon in each ton of charge. Write today for more complete information.

Mexite Briquettes

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICH.

THESE FOUNDRIES HELP KEEP MANPOWER ON THE JOB— *With Sanitary Bradleys*

Workers, in any plant, appreciate clean sanitary wash facilities—as a measure of health protection and, equally important, as a considerate act on the part of management. That is why progressive executives choose the most modern washing fixtures —Bradley Washfountains.

One Bradley Washfountain easily accommodates 8 to 10 persons simultaneously—serving them clean *running* water. Automatic foot-control and self-flushing drain protect hands from contaminating contacts, thus promoting health which helps keep manpower on the job.

Durably constructed for years of economical service, a Bradley installation cuts water consumption, reduces hot water costs, saves on piping as well as numerous plumbing connections. Bradleys are nationally distributed through plumbing jobbers.

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Lehigh Foundries
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BRADLEY *washfountains*

For details and suggestions, send for illustrated Catalog 4308 and Washroom Layout Book.

(*Continued from page* 184)

obtained when using either of the other types, and the pitch coke produces irons higher in total carbon than either of the other cokes, while melting with beehive coke produces iron of intermediate total carbon content.

4. Mechanical charging of the cupola usually improves the operation because it is easier to keep the cupola filled to the charging door level at all times during the melting operation, and the types of charging equipment used distribute both the metal and coke in the cupolas in a much more satisfactory manner than is accomplished by hand.

5. Weighing cupola charges accurately results in uniformity, not only in carbon results, but in all of the elements involved.—*J. P. McClendon, publicity chairman.*

St. Louis

DON C. LATELLA, senior engineer, Foundry Division, Norris Elliott Inc., was the principal speaker at the St. Louis District Chapter meeting at the DeSoto Hotel, St. Louis, Oct. 10.

Mr. Latella's talk was illustrated with slide illustrations on "Foundry Incentives." In substance, an explanation was given of setting up a work day—laying out production plans systematically. In addition there was a discussion of bonus earnings, and incentives for foundry workers.

A pre-meeting coffee talk on "Foreman Training" was given by R. L. Jones, American Steel Foundries. — *John W. Kelin, publicity chairman.*

Michiana

FIRST meeting of the Michiana Chapter, AFA, for the 1946-47 season was held at the Whitcomb Hotel, St., Joseph, Mich., Oct. 1. L. D. Pridmore, International Molding Machine Co., Chicago, addressed the 125 members and guests present on the topic of "Core Blowing."

The history of core blowing dates back to about 1911, according to Mr. Pridmore. During the first years, the blower was used on only fairly simple cores that did not need to be too accurate and none weighed over 2 lb. The first vents used were the round screen type. Later the slotted type vent was developed to be used were it is desirable not to show the vent on the casting.

He added that loose jointed core boxes permitting sand to blow out at the joints was one of the early troubles. Air pressure at 125 psi was used with small blow holes and although this was fairly successful, it was later found that about

(*Concluded on page* 188)

Vitrobond functions by PRECIPITATION and becomes Part of the Brick

VITROBOND
Born in Fire

VITROBOND is a highly refractory, precipitating, self-vitrifying high temperature furnace, firebox and crucible coating made from a zirconium silicate base and other high melting oxides. Vitrification begins at approximately 2090° Fahrenheit and can take place during the regular furnace operation. Vitrobond is literally "born in fire" and continuous or repeated heats only add to its effectiveness.

RESISTANCE TO SPALLING—All varieties of "Vitrobond" prefired shapes are so resistant to thermal shock that spalling is practically non-existant in industrial applications. Because of this "Vitrobond" is used to lower refractory costs and eliminate the frequent repairs in installations where refractories are subjected to intermittent quick cooling from high temperatures and reheating during pouring and recharging operations.

RESISTANCE TO ABRASION—Vitrobond, because of its inherent hardness of 8½ diamond scale, and its dense crystalline structure, is highly resistant to mechanical and flame abrasion. In such installations as furnace walls, roofs, arches and bunkers in open hearth furnaces using silca linings in the production of basic steel, Vitrobond eliminates wear and tear, cuts down on furnace repairs, and greatly extends the life of the furnace, giving many more heats before rebuilding. When used in reverberatory type furnaces, Vitrobond has proven highly effective on bunkers, side walls and run-off spouts. Repairs have been reduced greatly and the number of heats has been increased.

FORMS A MONOLITHIC WALL—Vitrobond, in its process of precipitation, vitrifies to the brick and forms a monolithic wall that will withstand the destructive effects of flame impingement and abrasion. It is not affected by sudden changes in temperature and has little thermal expansion and contraction.

VITROBOND CUTS FUEL COSTS—Leading furnace users have found that Vitrobond keeps fuel costs at a minimum because of its high reflection of heat and negligible heat storage. Also saves fuel because of the quicker heat-up time of the vitrified coating, and its quicker absorption of heat which it immediately dissipates by refraction.

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VITROBOND HAS MANY USES—Boiler fire boxes • Reverberatory furnaces • Locomotive oil-fired fire-boxes • Steamship oil-fired fire-boxes • Oil-fired crucible furnaces used in melting brass, bronze, monel, copper and various other non-ferrous alloys • Aggregate rammed furnace walls • Pit furnaces • Oil-burning end-fire furnaces • Forge furnaces • Barrel type (open fired) • Oil refining ovens • City Power Plants • Crucibles • Some heat-treating ovens • Open Hearths • Reheating Furnaces • Soaking Pits.

If overheated brick is your trouble write, wire or phone

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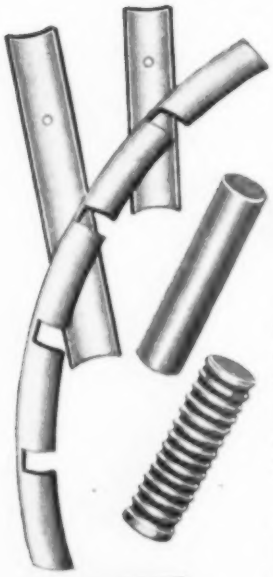

— are recognized throughout the foundry industry as dependable aids to higher and better production. Trifles in themselves, they have been constantly improved through the years . . . in both design and quality . . . to help the foundryman toward the production of castings which reach the highest possible degree of perfection.

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This modern catalog gives you complete information, prices, and latest discounts on Milwaukee Thread Stem Chaplets . . . Standard Radius Chills . . . Schmitz Chaplets . . . Angle Chaplets . . . Patented Adjustable Radius Chills . . . Shells, Tubes . . . related foundry specialties. It also contains helpful suggestions on Special Chaplets and Chills designed to meet your unusual requirements. If you haven't received your copy of this modern Milwaukee Chaplet Catalog, write for it on your business letterhead.

Milwaukee

CHAPLET AND MANUFACTURING CO.

1025 S. 40th STREET • MILWAUKEE 4, WIS.

(*Concluded from page* 186)

80 to 90 psi with large blow holes and plenty of vent holes meant better cores and far less wear on core boxes. Now, some boxes produce 100,000 to 150,000 cores before repairs are necessary.

In order to get best results, according to Mr. Pridmore, the following should be remembered: Over-venting does not harm but under-venting does; sand control is very important and water and oil should be added with the utmost care; the best coreroom materials obtainable are the cheapest in the long run, the cost of scrap castings being very high.

Mr. Pridmore showed pictures of different types and sizes of core machines and explained their operation and uses, showing how easily cores up to 400 lb may be blown.—*H. B. Voorhees.*

FRENCH FOUNDERS HOLD ANNUAL CONVENTION

(*Continued from page* 110)

the industry is allowed to invoice to its customers. It was stated that the budget for 1946 would exceed 60 million francs ($500,000), these funds being under government supervision.

These resources enable the Centre Technique to maintain a body of engineers and technicians who travel all over France to help foundries out of their difficulties and advise them on technical developments. A number of local laboratories are also being organized in certain centers such as Lyon, Nancy and Charleville. A research section is permanently at work at the headquarters of the Center in Paris, under the supervision of Mr. Daisne, general secretary of the Association Technique de Fonderie, with Professors Portevin and Bastien as advisors.

The Association Technique and the Centre Technique are closely connected and collaborate in the publication of *Fonderie*, a common publication of both organizations, published for the benefit of the whole industry. In his concluding remarks, Mr. Ricard said that the foundry is recognized as a basic industry in national economic reconstruction. He mentioned that, in France, heating apparatus consumes 17 million tons of coal annually and, therefore, any increase of efficiency is of considerable importance. He also mentioned that the corporation of foundry artisans in France dated back to the thirteenth century.

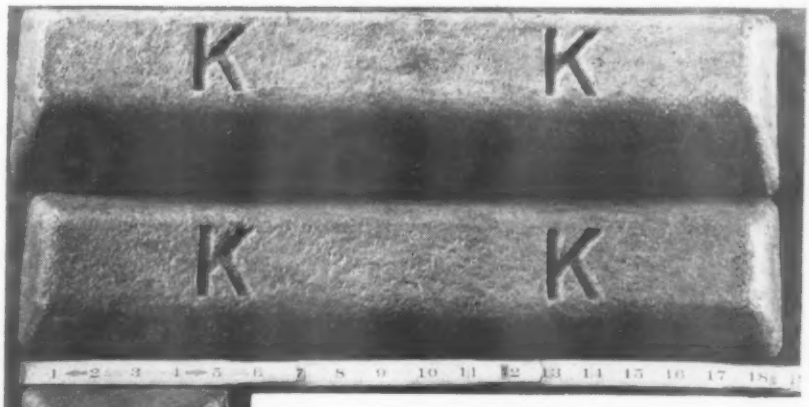
In the afternoon of Saturday, Oct. 19, delegates to the convention attended a ceremony in the course of which a sword was presented to Professor Chevenard,

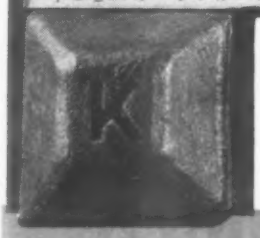
(*Continued on page* 191)

Automatic charging of Keokuk electric furnace in the manufacture of silvery pig iron.

Control IN HIGH SILICON PIG IRON

Because it is specially processed in the electric furnace, Keokuk Electro-Silvery has all the advantages of complete and constant control. The result is uniformity and high quality. Write today for full information and prices.





Keokuk Electro-Silvery

Keokuk Electro-Silvery . . . both standard and alloy . . . 60-lb. pigs for blocking the open hearth heat—30-lb. pigs for charging the cupola—12½-lb piglets (for foundries) so uniform in weight that they can be charged by count. All can be handled by magnet.

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A TOUGHER Refractory Cement Lining for TOUGHER Jobs

Gas Fired Crucible Furnace placed in service April 27, 1946. A 4" thick lining of CARBOFRAX Cement No. 30 is backed up with 1" of refractory insulating splits and 1" of mineral wool batts.

In operation since September 14, 1945, without maintenance, this oil fired crucible furnace has 3½" lining of CARBOFRAX Cement No. 30 which is backed up the same as the gas fired unit.

Used for melting monel, nickel, S-monel and inconel metals, these furnaces operate at relatively high temperatures. Production is on an 8 hour per day, 5 day per week basis. Ordinary linings could not endure the terrific beating to which they were subjected. Fireclay brick, used originally, had to be replaced at the end of six weeks.

In their search for a better lining, this foundry, nationally known producers of castings to exacting specifications, "discovered" CARBOFRAX silicon carbide cement No. 30. Giving 15 months average life with a minimum amount of maintenance they have now standardized on this material for lining all melting furnaces.

Easily installed, linings of CARBOFRAX cement No. 30 require little or no patching. Softening and slagging down are eliminated by their resistance to high temperatures. Also avoided is rapid wear caused by flame erosion. Up-keep is substantially reduced. Replacement expense is lowered. And retaining their dimensions for longer periods of operation, these linings radiate heat uniformly to the crucibles. This means improved service from the crucibles and a further cut in cost per pound of metal melted.

For the tough jobs, as well as those in which the conditions are not so severe, linings of CARBOFRAX cement No. 30 provide greater output at less expense. To get more specific facts write Dept. L-126, The Carborundum Company, Refractories Division, Perth Amboy, N.J.

SUPER REFRACTORIES

BY CARBORUNDUM

TRADE MARK

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(*Continued from page* 188)

president of the Association Technique in 1945, to commemorate his election to the French Academy of Science. This sword, which is an emblem dating back to the foundation of the academy, was presented by subscription. The ceremony was presided over by L. de Broglie, perpetual secretary of the academy.

Fourteen papers were presented during the three sessions of the convention. The first paper was the official Belgian paper, presented by F. Boussard, of Cie. Generale des Conduites d'Eaux, Liege, and the subject was "Foundry Defects." The author recommended classification of 67 defects under six main headings: 1. Defects due to contraction. 2. Defects due to the fluidity of the metal. 3. Defects due to the metal not answering to specification. 4. Defects due to the presence of inclusions. 5. Defects due to gases. 6. Defects due to the Leonard effect, which consists in an intense local formation of gas due to overheating of the sand. The author also described defects in accordance with their appearance and gave definitions of the main defects.

Discusses Centrifugal Casting

J. Boucher, of Ste. des Hauts-Fourneaux et Fonderies de Pont-a-Mousson, contributed a paper on "The Present Situation of Centrifugal Casting," in which he gave the general principles of three main methods: Complete centrifugation around a horizontal, a vertical or an inclined axis; semi-centrifuging around a vertical axis and centrifuging under pressure around a vertical axis. He mentioned that the lost wax process could be combined with centrifugal casting methods.

"Practical Comments on Gases in Cast Iron and Steel" was the title of a paper by E. Eyt, of Ste. de Commentry, Fourchambault et Decazeville. The author drew attention particularly to defects caused by viscosity of the metal and to slag, superficial tension, and the thermal conductivity of the metal. He stated that the questions raised were so complex and delicate that he did not attempt to give definite conclusions, but he wished to stimulate discussion on this problem.

The official British exchange paper was contributed by Frank Hudson, Mond Nickel Co. Ltd., London. The subject of the paper was "Standard Test Bars for Nonferrous Castings." The author mentioned that at the meeting of the International Association for Testing Materials held at Zurich, Switzerland, in 1931, the majority of members favored separately cast test pieces; the French, however, favored small pieces provided for on the casting itself. In 1932, the

(*Continued on page* 194)

CUT TRANSPORTATION COSTS "ON THE FLOOR" WITH STANDARD CONVEYORS

WHERE volume handling of flasks, jackets, molds, sand and castings is required—Standard Conveyor Co. can aid you in holding handling costs down.

Standard makes a complete line of roller conveyors to meet every production foundry need.

The Standard Conveyor design of roller with either shielded or sealed bearings provides years of trouble-free operation under the most trying conditions. Their construction assures the smoothest handling and movement of molds and flasks from molding to pouring station and return. Varying combinations, widths, and weight carrying capacities are available to meet individual requirements.

Investigate Standard Conveyors for foundry applications — either in sections or in complete systems for every phase of ferrous or nonferrous foundry work. Ask for bulletin F-126.

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When molding's complete — loaded on conveyors — jobs move smoothly and quickly to next stop.

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All lined up — ready for pouring and moving to shakeout and return to molders.

POURING STATION
Neatly aligned, the pouring job is simplified — molds can be quickly moved out of the way for cooling and shakeout.

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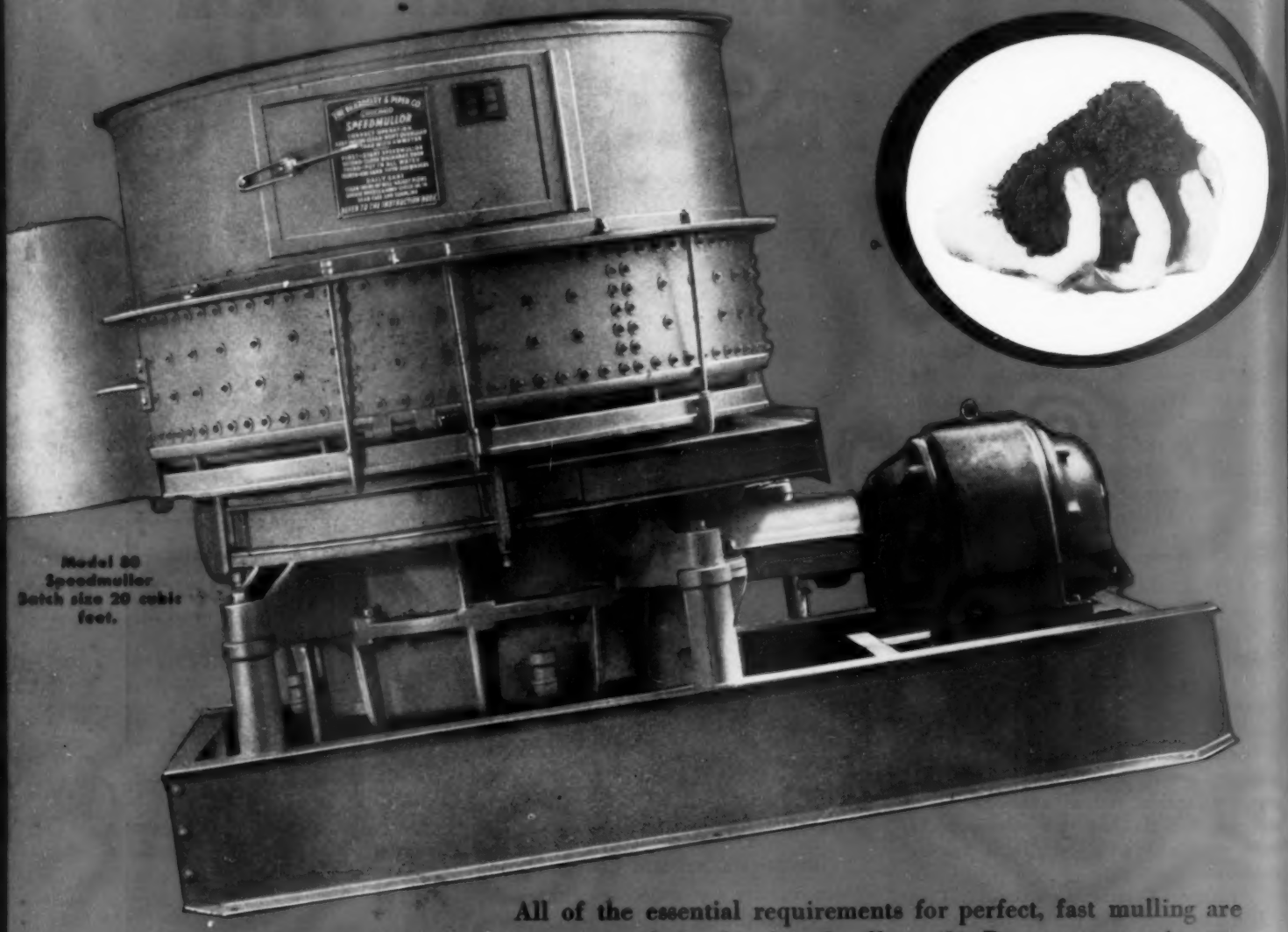
ENGINEERED FOR FASTER PRODUCTION

Speedmullor Sand...

MEETS YOUR EXACT REQUIREMENTS!



Model 80 Speedmullor Batch size 20 cubic feet.

Speedmullor-processed sand assures thorough distribution of all additions, is free from lumps and requires no further aeration. Every time, every batch, the Speedmullor mulls sand that will pass the most exacting tests!

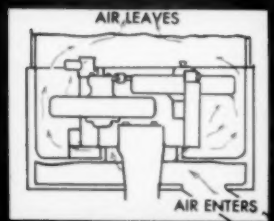
All of the essential requirements for perfect, fast mulling are incorporated in the Speedmullor: (1) Pressure — continuous squeezing without damaging sand structure; (2) Rapid agitation — entire batch receives thorough mulling; (3) Blending — uniform distribution of bonding elements; (4) Thorough aeration and fluffing.

The Speedmullor is the only machine that mulls the sand between a rubber-lined wall and rubber-tired wheels. These surfaces do not crush or grind and will outlast steel many times.

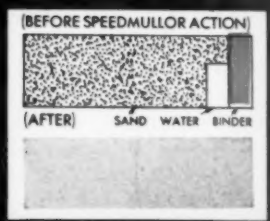
HERE'S HOW THE SPEEDMULLOR OPERATES

Speedmullor squeezes and kneads sand between resilient rubber surfaces which last indefinitely because of resistance to abrasive action.

Speedmullor action on sand holds it in suspension as it kneads and mulls . . . evenly coating each grain of sand with binding material.



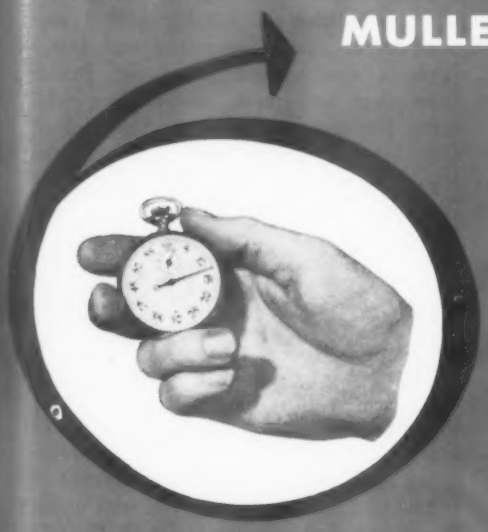
Air entering Speedmullor at bottom is forced through suspended sand, quickly cooling it to within a few degrees of room temperature.



Speedmullor causes rapid, continuous agitation of sand, binders and moisture. Constantly in motion, each sand grain becomes uniformly coated.

d. Speedmullor Sand

MULLED IN ONE TO TWO MINUTE CYCLES!



4½ TIMES FASTER!

The Speedmullor is *at least* 4½ times faster than any other mulling method! Time it yourself as the rubber-tired wheels squeeze the sand against rubber-lined walls. This action plows, tosses, tumbles and agitates the sand... providing the fastest, most thorough mulling possible.

Where desired the Speedmullor may be had with air cooling to bring hot sand down to room temperature *while it mulls.* In some instances a batch of sand is thoroughly mulled in only 30 seconds. Speedmullors assure large savings in core oils and binders . . . producing a mix which provides cleaner, smoother castings.

Speedmullors are offered in a variety of sizes, with or without skiphoist; air cooling; fines removal. Also available for completely automatic operation; batch weighing, loading, mulling, cooling, and discharging.

SEE THE SPEEDMULLOR OPERATE!

See the Speedmullor operate! We will make complete arrangements to have you see a Speedmullor in action in a foundry near to you. Write today!

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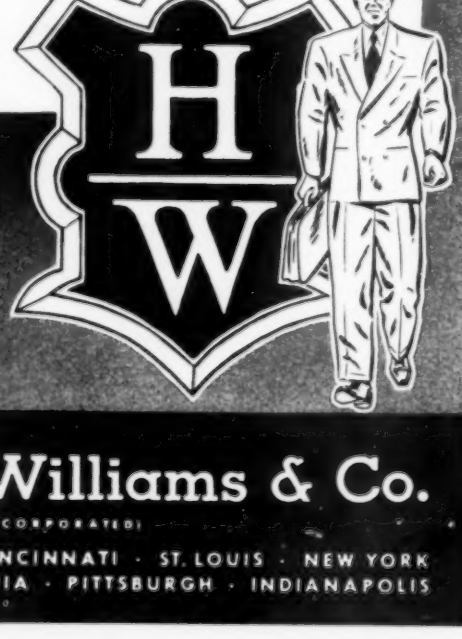
For cleaning castings faster, use "NATIONAL" SHOT GRIT



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(*Continued from page* 191)

late Dr. Rosenhain prophesied at the Institute of Metals in London that agreement would eventually be reached on a combination of suitably placed cast pieces of small dimensions and larger pieces cast separately. Later, British founders and users, co-operating with the British Standards Institution, helped in bringing out a code indicating the position of test pieces taken from the casting, and a standard test piece cast separately. The paper describes the provisions of this recommended code.

G. Delbart, director of the Institut de Recherches de la Siderurgie, and Mr. Potaszkin presented a contribution on "The Study of High Tensile Special Cast Irons." In this paper the authors gave the results of their investigations on 12 grades of cast iron, two without alloying elements and with carbon content of 2.83 to 2.85; one iron alloyed with nickel and chromium containing 2.47 C, 1.73 Si, 1.98 Ni, 0.176 Cr; and nine irons alloyed with nickel and molybdenum. The authors mentioned that inoculation with calcium silicide has a beneficial effect on the physical properties and the structure of the irons, even when they have been prepared in the basic arc furnace. With regard to casting temperature, it was found that porosity occurred when the iron was cast at low temperature.

Making Ingot Molds

A paper on "The Manufacture of Ingot Molds for Steelworks" was contributed by Mr. Charmeau, of Ets. Schneider, Le Creusot. The conclusions of the author are that cast irons with an open grain seem to give the best results. At present, when the ferrite-graphite structure is not always constant, a heat treatment for graphitization is advisable. Certain additions, such as titanium and vanadium, or chromium and titanium have improved results and are worth exploring further.

R. Buquet, Service Technique Aeronautique, Ministry of Armament, contributed a paper on "Foundry Control in Aviation Manufacture," in which he described the rulings established by the French aeronautical technical department issued in January, 1946, for the control of castings made for airplanes.

The American exchange paper was read by Vincent Delport, European manager of THE FOUNDRY, at the session of Saturday, Oct. 19. The subject was "The Modernization of Small and Medium Size Foundries with a view to Increasing Production." This paper was prepared by C. W. Schwenn, plant superintendent, Brillion Iron Works Inc., Brillion, Wis. The author described methods by which production can be intensified, especially in regard to handling equipment, in foundries that cannot afford to invest considerable capital in

full scale mechanization. Many operations can be effected more efficiently by the use of magnets, trucks and conveyors.

A method was described of collecting slag from the cupola effectively and without interrupting operations. Mention was made of the use of electric monorails for carrying ladles. The author emphasized the necessity for a foundry to have a modern and well equipped pattern shop. The American contribution was followed with great interest, and A. Le Thomas said that while many foundries in France had adopted the methods recommended by the author, the paper would be of considerable assistance to those who contemplated modernizing their foundries.

Dr. L. Jenicek, consulting metallurgist, Prague, Czechoslovakia, gave a paper on "The Combined Use of Binding Materials in Foundry Sands." The author stated that no single binder gives all the requirements needed, and he reviews various combinations of binders, which he divides into three groups: Nonorganic binders, such as bentonite and clay from natural sands; organic binders combined and a combination of nonorganic and organic materials. The results of the author's experiments were given, showing those cases where results were satisfactory and the unsatisfactory combinations.

Studies Microscopic Structure

Prof. F. Girardet, founder at St. Die, Vosges, and past president of the association, gave a contribution entitled: "Electro-Chemical Theory of the Action of Reagents Used for Microscopic Metallography of Gray Cast Irons." The author's thesis was based on a long series of experiments, and he applied his theory to the examination of cast iron used for making ingot molds. In this connection it has been confirmed that for ingot molds the iron must be homogeneous, with open graphite well distributed. It is best to use new iron (usually hematite iron) to which is sometimes added special alloys. The author does not favor the use of remelted iron.

Description of a "Polarographic Method for the Analysis of Metals in the Foundry" was given by Mr. Spalenka, of Prague, Czechoslovakia. The paper described a simple apparatus based on polarographic analysis, which enables the determination to be made of metals in alloys and of impurities in metals. Current analysis can be made of Cu, Ni, Cr, Mn, Co, V, Mo, in steel, and similar analysis can be effected for alloys of copper, aluminum, magnesium, lead and zinc.

A contribution of practical interest was made by G. Joly, in charge of the metal-

"IT'S REALLY PORTABLE!"

The Mulbaro ... the *only* portable mullor ... outstanding for its mulling flexibility, economy in operation and low initial cost! Small, medium and large foundries are using one or more Mulbaros for mulling molding and core sand.

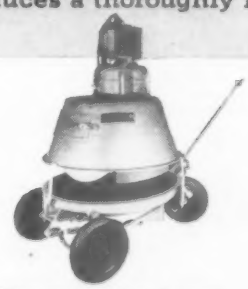
Available in two sizes ... 7 cu. ft. batch capacity (illustrated here) and 3½ cu. ft. batch capacity.

B&P

THE MULBARO

Top portion or mulling mechanism of Mulbaro contains a steel plow and 2 rubber-covered wheels, which are designed to give the maximum in mulling efficiency. The Mulbaro's squeezing and kneading action provides proper distribution of all additions and produces a thoroughly mulled sand.

Barrow filled with sand easily pulled by one man to mulling mechanism.



Mulling mechanism lowers onto barrow ... button is pressed and Mulbaro operates.

Barrow is wheeled to wherever sand is wanted and is automatically dumped.

Write today for the new Mulbaro catalog!

The BEARDSLEY & PIPER COMPANY

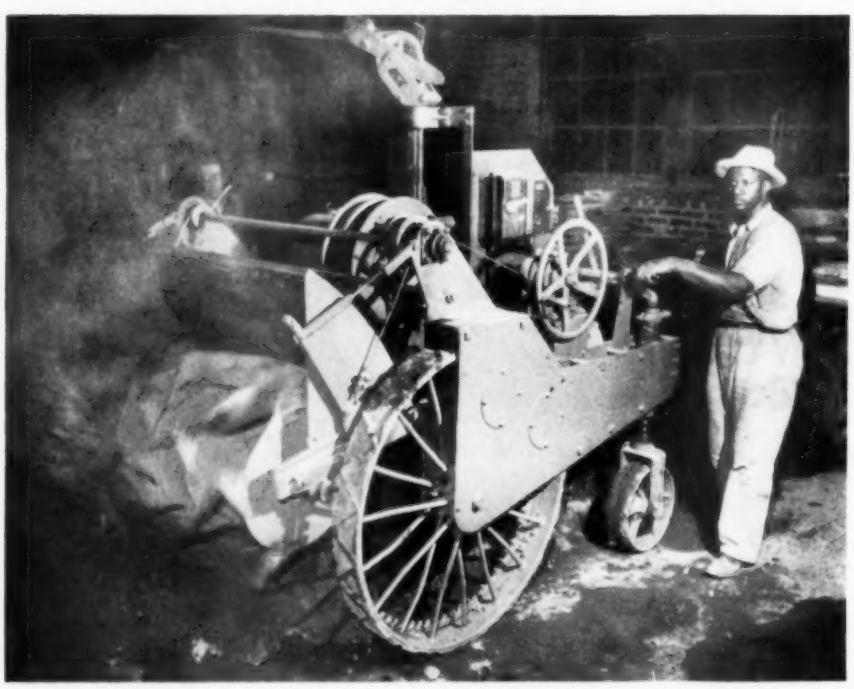
General Offices: 2424 N. Cicero Avenue Plant: 2541 N. Keeler Avenue
Chicago 39, Illinois

Beardsley & Piper are manufacturers of Sandslingers, Speedslingers, Speedmullors, Screenarators, Mulbaros, Shakeouts, Sand Conditioning Machines, Gyratory Screens.

How to control YOUR TEMPER!

American Sandcutters control the temper and condition of sand by churning through every cubic foot at least 150 times. . .mixing, aerating, cooling . . . eliminating dry spots, wet spots, lumps and pockets of new sand by thoroughly distributing bond and moisture. Always uniform, American-cut sand riddles fast, rams easily, vents perfectly, overcomes common molding faults that result in defective castings.

These and other cost, time, and labor-saving advantages have made Sandcutter the popular choice of progressive foundries for 38 years. Made in four models and in numerous sizes to meet every requirement. Write today for literature.



Model AM Sandcutter installed at Haven Malleable Castings Co., Cincinnati, Ohio

WRITE FOR COMPLETE CATALOG

The "American Line" catalog illustrates and describes every Sandcutter model as well as all other American Foundry Equipment Co. products. Send for your free copy today.

American Sandcutter

FOUNDRY EQUIPMENT CO.

505 S. BYRKIT STREET, MISHAWAKA, INDIANA

lurgy of cast iron at the Centre Technique de la Fonderie. The author described the "Dimensions and Shapes of Tuyeres in Cupolas." He showed that a simple formula gives the relation between the total section of the tuyeres and the inside section of the cupola.

The formula is given as: $\frac{S}{s} = \frac{100}{p}$

where S is the inside section of the cupola, s the total section of the tuyeres and p the percentage of coke between the charges. Thus the section of the tuyeres can be expressed as a percentage of the section of the cupola by the same number as the percentage of coke between the charges.

R. Coupel du Lude, director, Association des Industriels de France contre les Accidents du Travail, gave a paper on "The Prevention of Accidents and the Spirit of Security in the Foundry." The author stated that the value of measures taken to prevent accidents depends essentially on fostering the right attitude of mind toward security. He then described the various means by which the desired results can be obtained.

Save Fuel in Cupola

The last contribution was by J. Bobst, of Lucerne, Switzerland. The subject was "Technical Possibilities of Savings in Fuel in Melting Metals, especially in Cupola Practice." The author reviewed the various means by which fuel can be conserved without reducing the quality of the casting. The main points covered the thermic conditions in the various zones of the cupola, the design and correct operation of the cupola, recuperation of lost heat and coke specifications. Various indirect means of saving fuel were also mentioned.

At the end of the session the Gold Medal of the Association Technique de Fonderie was presented by Mr. Le Rolland, director of Technical Education at the ministry of Education, to Mr. Laplanche of Fonderies Citroen, in recognition of the many and valuable contributions he has made to certain metallurgical developments. After a general review of the results of the convention given by A. Le Thomas, Mr. Le Rolland gave the closing address in the course of which he eloquently emphasized the interest that the ministry of Education is taking in the activities of the foundry industry, and his own personal interest in the training of young men destined to take up foundry work as a profession.

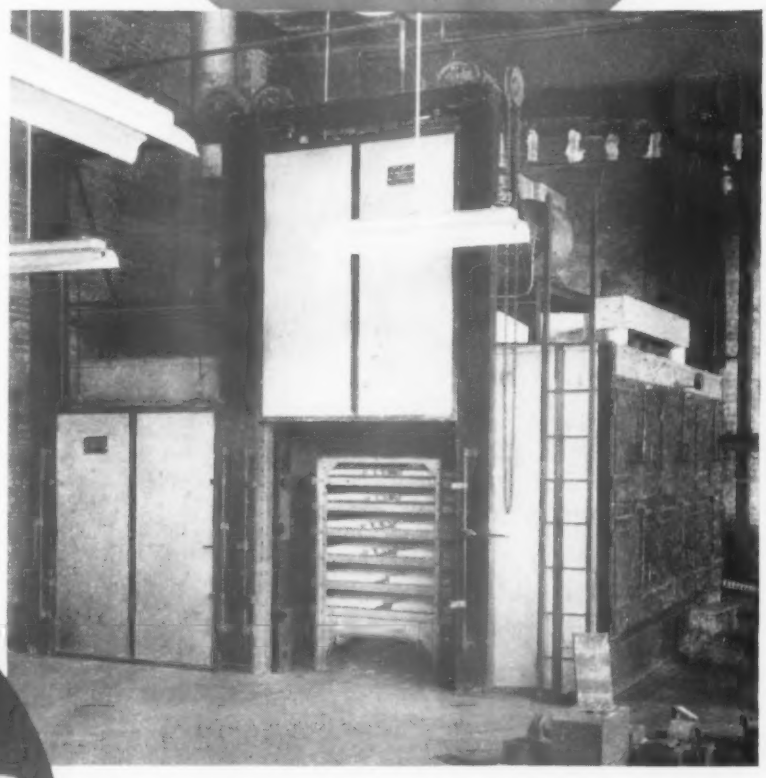
Apsco Pipe & Supply Co. Inc., 21330 Hart St., Los Angeles, has obtained approval for construction of a pipe foundry. The new one-story, steel frame structure will cost about $33,000.

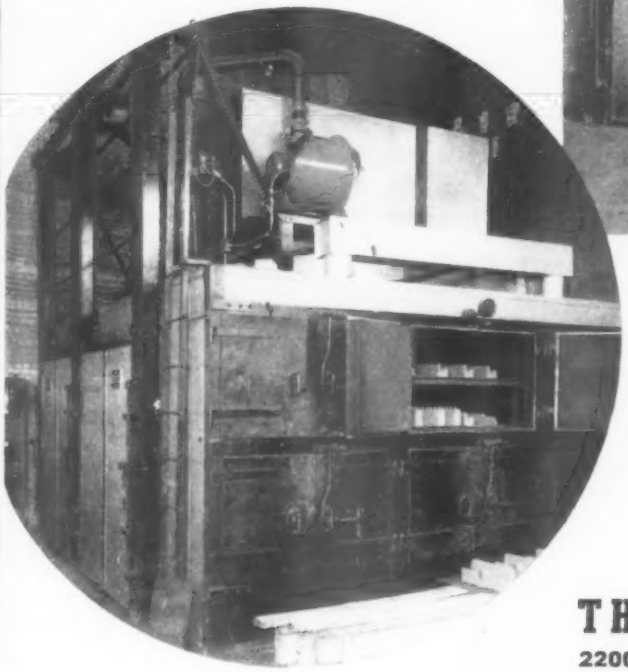
Modernize with MAEHLER

. . . for higher production and better baked cores—modernize your core baking facilities with Maehler-engineered equipment.

You can turn out better cores, faster and at less cost with Maehler-engineered ovens. One reason for this is the recirculating air heat principle which is incorporated in Maehler ovens. This principle, pioneered and perfected by Maehler, assures perfect heat uniformity, shortens baking time, gives you more perfectly baked cores and eliminates green or burned cores.

Maehler core and mold ovens are available in a complete range of oil-fired, gas-fired and electrically heated units. Plan now to modernize your core-baking facilities. Call a Maehler engineer today or write for latest bulletins.





The photos reproduced here, taken at the American Brake Shoe and Foundry Co., show a Maehler oil-fired, four-rack, double compartment lift door oven which was installed to replace obsolete coke-fired ovens. The view at the left shows the six double door side compartments in this oven for small cores. With this modern Maehler installation the user reported more uniformly baked cores, one bake every 2½ hours instead of one per day, elimination of smoke in the core room and low cost efficient operation.

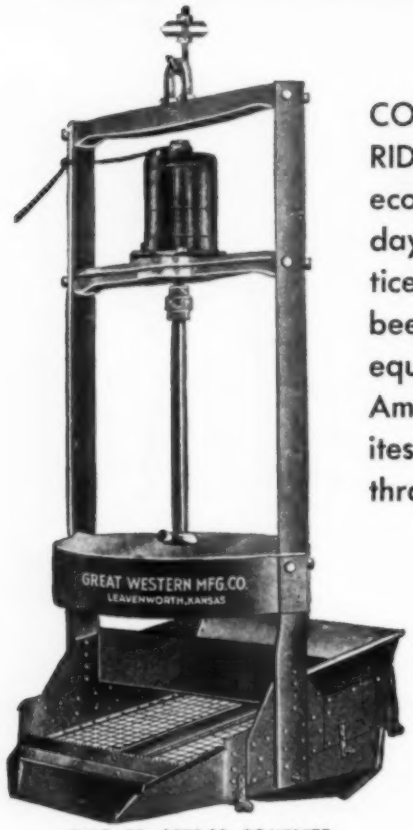
THE PAUL MAEHLER COMPANY

2200 WEST LAKE STREET CHICAGO 22, ILLINOIS

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

COMBS GYRATORY FOUNDRY RIDDLES



TYPE CS—$270.00 COMPLETE
F.O.B. LEAVENWORTH

COMBS GYRATORY FOUNDRY RIDDLES assure the greatest economy and efficiency in today's high speed foundry practice. These Riddles have long been accepted as standard equipment in foundries all over America and remain the favorites of modern foundrymen throughout the industry.

COMBS GYRATORY FOUNDRY RIDDLES and Equipment are available to you in Foundry Supply houses everywhere. Full information will be sent at your request.

Extra Screens Save Money
Rims are made of heavy steel. Bottoms of extra heavy galvanized after woven wire cloth.

TYPE CR—$260.00 COMPLETE
F.O.B. LEAVENWORTH

Great Western
Manufacturing Company
LEAVENWORTH, KANSAS

Electric Furnace Steel Conference

Fourth annual conference of the Electric Furnace Steel Committee of the American Society of Mining and Metallurgical Engineers will be held at William Penn Hotel, Pittsburgh, Dec. 5, 6 and 7. During the three-day meeting ten technical sessions will be held including an educational session on chemistry of the electric furnace process. On Thursday, Dec. 5, opening session will be a general one relating to both acid and basic practice which will be followed by separate sessions on acid melting of high alloy steels and charging the basic furnace. In the afternoon a joint meeting on acid and basic metallurgy will be held.

On Friday morning a session on importance of slag in acid practice will be held simultaneously with one on oxiding slag heats in basic practice. In the afternoon a session on sulphur in acid practice will be held at the same time as one on basic practice for stainless steel. The latter will be followed by a session on basic melting practice for high speed steel. On Saturday morning an educational session on chemistry of the electric furnace process will be held with Gilbert Soler, Atlas Steels Ltd. giving a lecture on basic practice, and C. E. Sims, Battelle Memorial Institute, discussing acid practice. This will be followed by a panel discussion with seven experts to answer questions.

Hold International Committee Meeting

Preliminary meeting of the International Committee of Foundry Technical Associations was held Oct. 19, in Paris, with the following representatives attending the meeting: R. Deprez, president, and L. Foulon, treasurer, Foundry Association of Belgium; Prof. Pisek, president, and Ladislav Jenicek, official delegate, Czechoslovak Foundrymen's Association; A. Brizon, past president, and Mr. Laisne, general secretary, French Foundrymen's Association; D. H. Wood, president, and V. C. Faulkner, past president, Institute of British Foundrymen; Mr. Spies, president, and Dr. Lipps, Foundry Association of Holland; Prof. Gierdziejewski, president, and Eng. J. Dickman, Polish Foundry Association; and Vincent Delport, European representative of the American Foundrymen's Association.

J. Lobstein, past president of the French Foundrymen's Association, who was elected president of the International Committee at the London congress in

(*Concluded on page 201*)

3 PROVED Ways To BOOST FOUNDRY PROFITS

WITH A

DESPATCH

VERTICAL CONVEYOR CORE-BAKING OVEN

IF you're looking for *proved* ways to keep core costs down and increase profits, too, then here's an answer—a DESPATCH Vertical Oven, expertly engineered to fit your foundry's special needs.

Need for faster output of better castings, increased competition, skyrocketing labor and over-head and limited floorspace are problems this oven can help you solve profitably *right now.*

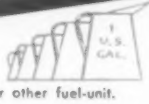
Maximum
BAKING OUTPUT PER MANHOUR

No other type of oven uses labor so efficiently nor provides such direct straight-line handling. Fastest route from coremakers to oven with each man's work area covering only a few feet. Handy-level loading, built-in cooling section and other work-saving features.

Maximum
CORE OUTPUT PER FT. OF FLOOR SPACE

Compact vertical construction, forced convection heating and ingenious arrangement of core racks on conveyor makes *best* use of limited floorspace. Sizes capable of baking up to 10,000 lbs. per hour yet using only 10′ x 10′ floor area.

Maximum
CORE OUTPUT PER GALLON* OF FUEL



*Or other fuel-unit.

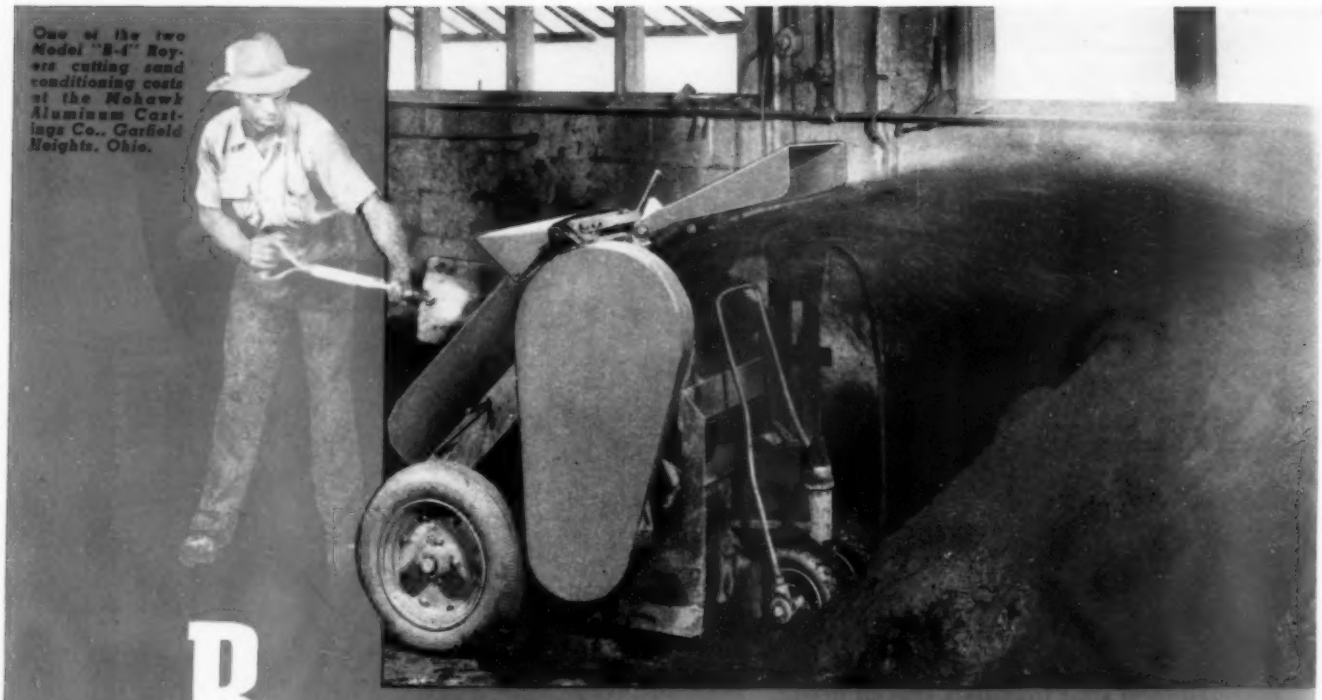
A Despatch vertical conveyor oven recirculates up to 75% of heated air. With engineered oven design that keeps heat loss at minimum, peak efficiency is assured under all operating conditions. Results in extra low cost per ton of baked cores. (Figures on request).

WRITE TODAY for data on savings possible with Despatch mechanized ovens. Actual figures, floor plans and other data you'll find tremendously helpful.

DESPATCH OVEN CO.
615 SE 8th Street
Minneapolis 14, Minn.

DESPATCH OVEN COMPANY

OVER 44 YEARS EXPERIENCE AS ENGINEERS AND BUILDERS OF ALL TYPES OF FOUNDRY OVENS



One of the two Model "B-4" Royers cutting sand conditioning costs at the Mohawk Aluminum Castings Co., Garfield Heights, Ohio.

"OUR ROYERS CUT DOWN THE HAND WORK IMMEASURABLY, BUT WHAT WE LIKE MOST IS THE FINE WAY THEY CONDITION SAND."

Time and labor savings in sand preparation are always important—perfectly conditioned sand is even more so. Both these advantages are provided by the Royer Sand Conditioner and Blender. Hence the above expression from the Mohawk Aluminum Castings Company, after using two Royers for a year. A recent letter from the user reads:

"We are well satisfied with the performance of our Royers. They cut down the hand work immeasurably, but what we like most is the fine way they condition the sand. We find we have fewer cope drops and wet sand blows since we have been using these machines."

Whether you pour aluminum, brass, bronze, grey iron, malleable iron, semi-steel, steel or alloys, the Royer will give you properly conditioned sand at minimum cost.

One or two men with a Royer can prepare enough sand in a few minutes to keep a crew of molders busy for hours.

A single pass of your heap sand through a Royer makes an open, fluffy sand that minimizes blows, runouts and scabs, drops and skids, surface inclusions and rough casting surfaces. Royers definitely improve casting quality and cut discount losses.

There's a Royer of correct type and size for every foundry requirement. All are shown in Catalog No. 744. Write for your copy.

The ROYER FOUNDRY Sand Conditioning EQUIPMENT

Send for this book.

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

(*Concluded from page* 198)

1939, presided at the meeting, and Tom Makemson acted as honorary secretary, the post he has held since the inception of the committee. A. Le Thomas, director of the French Foundrymen's Association was also present to advise on the question of the Committee on Testing Cast Iron. Mr. Delport summarized past activities of the International Committee and of the results of the meeting held in Cleveland in May, 1946. General discussion resulted in the agreement that the committee should be revived and that the nucleus of the revived committee would be comprised of the associations represented at the meeting.

Mr. Lobstein was elected president for 1947. For vice president, Great Britain was invited to nominate a member of the Institute of British Foundrymen who will serve as president in 1948. Tom Makemson was unanimously re-elected honorary secretary.

Under existing rules countries that have a properly constituted technical foundry association may qualify for membership, or a properly constituted technical section of an association, which would be representative body of that nation on the committee.

COMPRESSED AIR ISN'T ALL WET

(*Continued from page* 103)

the tool will be practically dry.

2. To obtain really dry air in the lines, regardless of the make or type of compressor, the air must be cooled below the temperature at which it will be used. In other words, the air must be cooled to a point where no further cooling will occur to cause the precipitation of additional water.

This cooling is done in an aftercooler, installed in the line from the compressor to the air receiver, and consisting of a nest of pipes, or tubes, through which the compressed air passes, and around which cool water flows. The proportions of a good aftercooler are such that the air will be cooled to within 15 F of the water temperature with 0.1 to 0.2 gal of water per minute for each 100 cu ft of air compressed to 100-lb gage pressure. The water from the aftercooler is then used to cool the compressor.

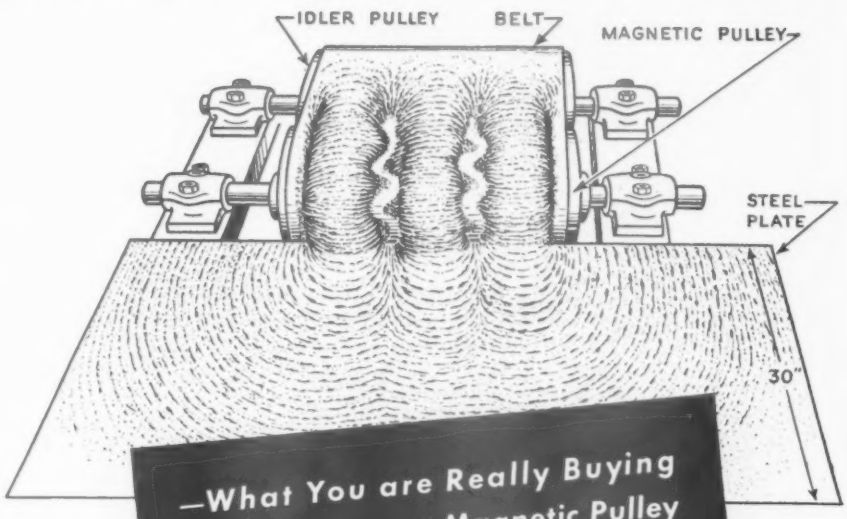
Using the same conditions as in the foregoing example, with a room temperature of 90 F it is obvious that any water temperature under 75 F will produce air below 90 F, which will be dry when used.

A separator placed at the outlet of the receiver separates the water from the air

(*Concluded on page* 204)

"Picture" of

MAGNETISM



—What You are Really Buying When You Buy a Magnetic Pulley

The above illustration was made from a photograph of the pattern formed by iron filings introduced into the magnetic field surrounding a Dings High Intensity Magnetic Pulley. Note that the filings are influenced by the powerful magnetic lines of force at a distance of 30" from the pulley! You want the most powerful magnetic field and greatest iron-removing ability you can get for your magnetic separator dollar. Dings delivers you the maximum on this score by means of bronze coil covers, air-cooling and correct proportioning of steel and windings. For maximum separating power, select Dings. CATALOG 260 on request.

DINGS MAGNETIC SEPARATOR CO.
4708 W. McGeogh Ave.
Milwaukee 14, Wis.

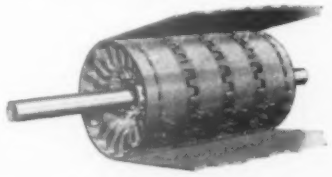
"High Intensity"
Dings

"Separation Headquarters since 1899"

WHY DINGS PULLEYS ARE MORE POWERFUL

BRONZE COIL COVERS

Make This Test! Across one horseshoe magnet place a steel keeper bar—nothing across the poles of the other. Lower the magnets slowly toward paper clips on the table. When the "unkeepered" magnet is within about an inch of the table it snaps up the clip. The magnet with the keeper doesn't pick up its clip until within about ¼ inch because the steel keeper "short-circuits" the lines of force and reduces the intensity and depth of the magnetic field. That's why Dings uses *bronze* coil covers on its pulleys instead of steel. Bronze has no effect on the magnetic field.

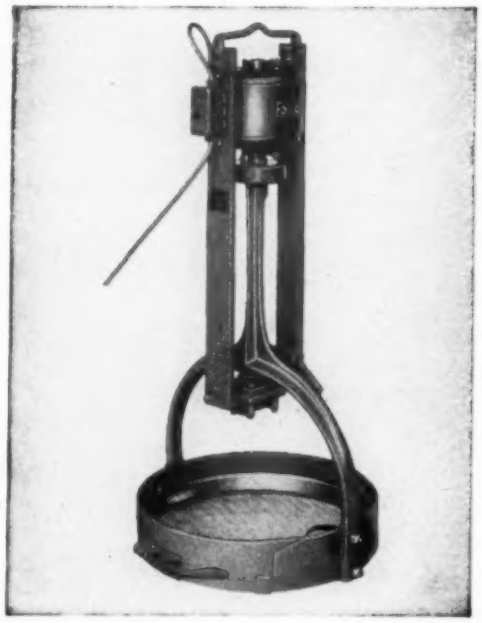


AIR COOLED

Heat increases magnet coil resistance. This reduces amperage which in turn decreases magnetic strength. Air cooling dissipates heat generated in the coil thereby providing cooler operation and *maximum magnetic strength.* (Cooling is accomplished by serrated radial openings and longitudinal openings. Rotation of the pulley plus action of belt create forced air circulation.)

"All Federal Produce S

FEDERALS



FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shovelling room. Write for information. Prompt delivery.

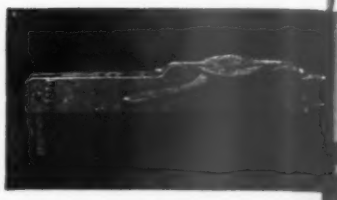
FEDERAL JOLT MACHINES

Air operated, fool-proof jolt machines that ensure uniform cores. Sturdy cast iron construction with no external valves to wear out. Made in four sizes. Get our prices and deliveries.

RUBBER-COVERED SHOVEL HANDLES

The best insurance you can buy against damaged patterns, core boxes or flasks. The pean-shaped grip is ideal for ramming.

They will fit your present shovels or you can order your next shovels with them already installed.



The "Lightning" Clamp

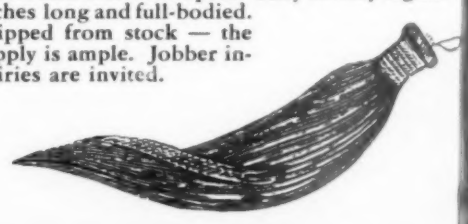
The "Holdtite" Clamp

Federal offers two types of fl clamps.
The "Lightning" clamp is an centric type, requiring no wed and available in two sizes: No. 8" to 12" and No. 3, 12" to 2
The "Holdtite" is an adjusta clamp designed for use w wedges and is also offered in t sizes: No. 1, 13" to 23" and N 0, 18" to 33".
Both clamps made of sturdy ma able iron, rigidly reinforced prevent distortion.

MEMBER

MANUFACTURERS' ASSOCIATION, INC. FOUNDRY EQUIPMENT

SWABS—We have eliminated the shortage of this essential item by making them ourselves. Federal swabs are made of the best flax, ample in size and won't fall apart. They're fully eighteen inches long and full-bodied.
Shipped from stock — the supply is ample. Jobber inquiries are invited.



THE FEDERAL FOUNDRY

Seacoal Plant
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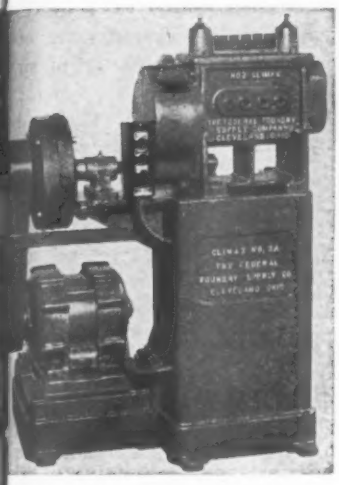
L SUPPLIES



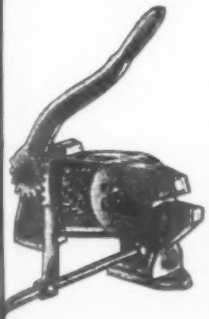
CLIMAX WIRE STRAIGHTENERS

y foundry, large or small, n cut production costs by aightening and re-using e wires and rods. With a imax Wire Straightener this be done quickly, eco- mically, safely — by un- illed labor. A complete scriptive circular is yours the asking.

"The Twist Does The Trick"

TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

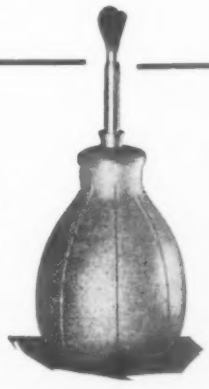


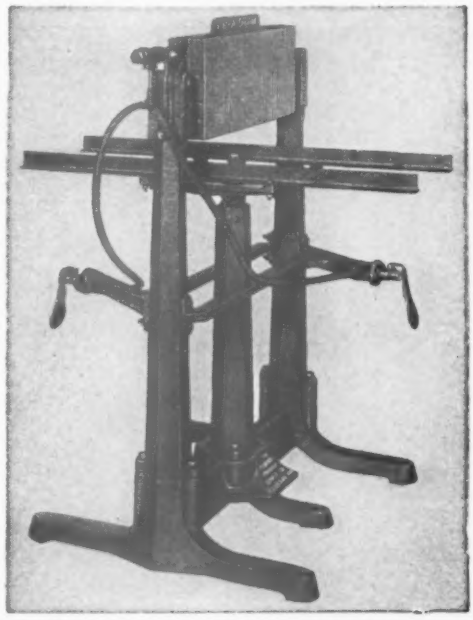
FEDERAL'S WONDER CUTTERS

Two compact cutters for rods and band iron. One cuts up to 5/8" round and the other to 7/8" round. Readily mounted on any bench. Users say they're worth their weight in gold!

WATER BRUSH

Easy to Grip and Hard to Tip. It can't leak and one filling lasts all day. Does not tire the molder's hand.



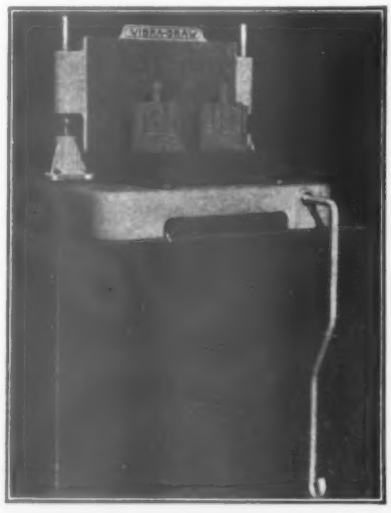


FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINES

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box.

Made in two styles: the floor model shown above and the portable bench model below.

Immediate delivery—write for details.



RY SUPPLY COMPANY · 4600 EAST 71st STREET CLEVELAND 5, OHIO

LOUIS · ATTANOOGA, TENN. · ST. PAUL · NEW YORK · RICHMOND, VA. · Mines UPTON, WYO.

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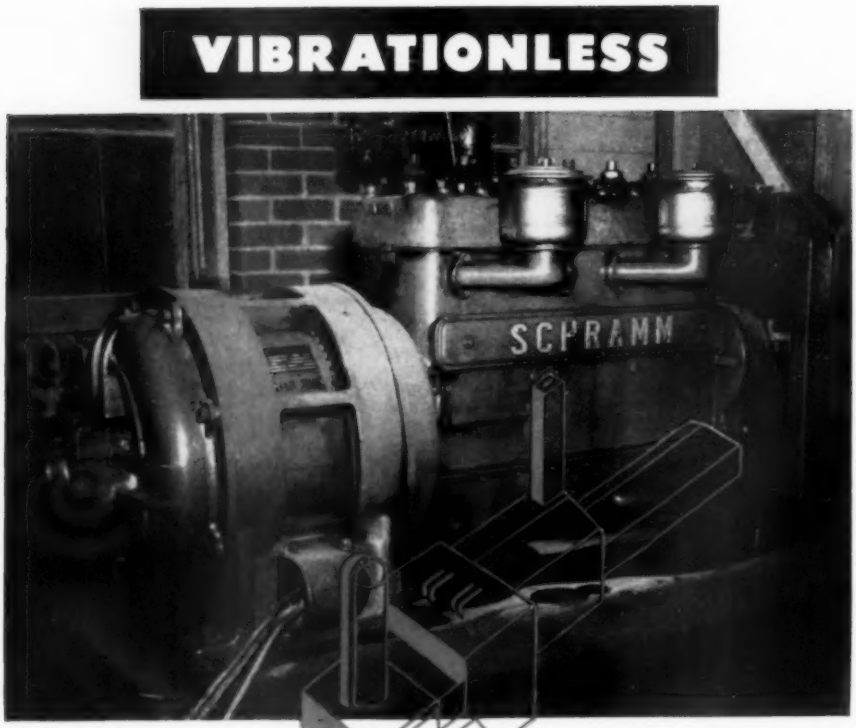
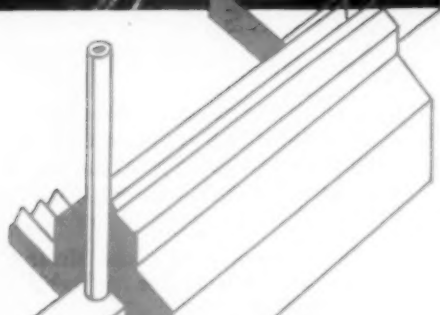
VIBRATIONLESS





. . . no matter where

SCHRAMM AIR COMPRESSORS

are installed in your plant!

No vibration . . . but all the air you want! Schramm Air Compressors are easily installed, require a minimum of space, and are compact: yet NO VIBRATION!

Schramm Air Compressors are specified by industry today because they furnish all the air you want, whenever and wherever you want it. Each unit is tested before it leaves the factory, and goes to work as soon as it is installed.

Both stationary and portable units are available, in every size mounting and assembly. A new Booklet giving full construction details and advantages you get with Schramms is yours for the asking. Write us today for your copy.

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

(*Concluded from page* 201)

by a swirling, centrifugal action created by the velocity of the compressed air entering the separator tangentially, and by filtration through a porous material which permits the passage of air but prevents the passage of water or oil.

Some separators are placed at the end of the aftercooler. The separator then has to remove all of the moisture. With the separator placed in the line from the air receiver, and the compressed air going directly to the air receiver, the reduced velocity of the air in the receiver will permit most of the moisture to fall out, and leave less moisture for the separator to remove. Drier air will result.

A realization of these characteristics of compressed air and of the ability of air to carry moisture, and the intelligent use of one of the methods described, should enable any person to eliminate wet air as one of his troubles.

AFA Committeemen Are Appointed

A F. Pfeiffer, assistant general superintendent, Allis-Chalmers Mfg. Co., Milwaukee, heads the 1946-47 pattern division program and papers committee, American Foundrymen's Association, with H. K. Swanson, Swanson Pattern & Model Works, East Chicago, Ind., as vice chairman.

Other committee members are: J. W. Costello, supervisor, American Hoist & Derrick Co., St. Paul; F. H. Goodwin, Goodwin-Bradley Pattern Co., Providence, R. I.; G. A. Pealer, pattern foreman, Elmira Foundry Co. Inc., Elmira, N. Y.; E. Pierie, pattern superintendent, Motor Pattern Co., Cleveland; H. E. Lees, pattern superintendent, Whitin Machine Works, Whitinsville, Mass.; M. Rintz, foundry superintendent, Continental Foundry & Machine Co., East Chicago, Ind.; W. G. Schuller, assistant purchasing agent, Caterpillar Tractor Co., Peoria, Ill., and A. H. Stenzel, Stenzel Pattern Works, Houston, Tex.

Mall Tool Observes 25th Anniversary

Mall Tool Co., Chicago, is celebrating its 25th anniversary this year. The business was established in Milwaukee in 1921 by A. W. Mall, company president. Flexible shaft machines, the first product, were assembled by hand and sold in quantities of one or two at a time. In 1922 the business was moved to Chicago, where it has expanded continuously and is now a large manufacturer of quality portable power tools.

What... Remodel Iron Parts Already Cast?

Yes, right on the production line ...with NI-ROD

Here's an interesting Ni-Rod case history . . .*

It shows how easily Ni-Rod can simplify design changes and speed production.

Grey iron manifolds like the one at the top became outmoded when an additional port was required.

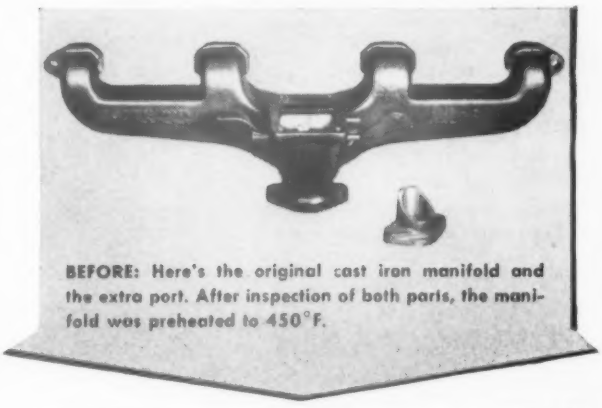
But, quickly and easily, Candler-Hill Corporation, of Detroit, remodeled the manifolds on hand, using Ni-Rod.

Saving time, money and labor . . . this company cut a correctly located hole in each casting, then welded on a secondary port using an a.c. transformer-type welder drawing 160 amperes.

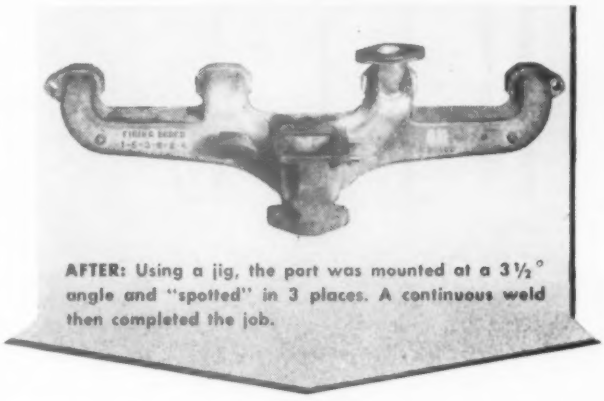
Since other rods gave less favorable results, Candler-Hill was particularly gratified with Ni-Rod. It speeded-up the process, required less preheat and post heat, and the machinability of the weld allowed quick boring of the port. Position of ports was held within ± ½°, and all other dimensions were held within ± .003".

Try a 5-lb. package of Ni-Rod. Use it on a.c. or d.c., and see how easy it is to get strong, sound, machinable welds in cast iron.

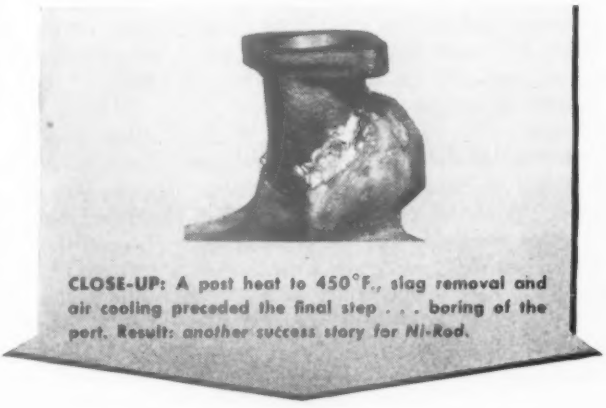
*Reg. U. S. Pat. Off.



BEFORE: Here's the original cast iron manifold and the extra port. After inspection of both parts, the manifold was preheated to 450°F.



AFTER: Using a jig, the port was mounted at a 3½° angle and "spotted" in 3 places. A continuous weld then completed the job.



CLOSE-UP: A post heat to 450°F., slag removal and air cooling preceded the final step . . . boring of the port. Result: another success story for Ni-Rod.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

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The adventures of BILL

By PAT DWYER

Drawings by RICHEY

"YOU WILL kindly check me," Bill remarked the other night, "if I am mistaken, but it seems to me that every succeeding year flies faster than the year before. By the way the wild north wind is whistling around this here now modest little igloo, we are in the midst of winter. Almost a continuation of last winter with no intervening spring, summer or fall. Do you suppose the famous atomic bomb may be responsible for this remarkable climatic condition?"

"You may enjoy the unique distinction," I said, "of probably being the only man in the world who does not know all about the atomic bomb. For the past year the bomb has been dinned into our eyes and ears by lectures, interviews, opinions expressed in what passes for literature, and on the radio until I am weary. If I never hear of it again it will be too soon. At the moment I have a problem of my own. I am supposed to forward a nice, sprightly contribution to a certain magazine (Name cheerfully furnished on request) for the December issue. Up to the present I have failed to hit on a suitable topic. And please do not suggest that I write about the atomic bomb."

"Well," said Bill, "I'll tell you. I'm just as sick of the bomb as you are. However, cheer up my boy. I can tell you a story of a little bum—that's right,b-u-m, bum. Maybe you can twist it around a bit to suit your purpose. Harry Richey has seen similar characters hundreds of times and can make you an elegant picture to properly illustrate the story.

"This story came to me by hearsay and I have no reason to doubt it. The teller is a substantial and reliable citizen who gets around, as the boys say, and sees and hears a great many things that do not attract any attention from the ordinary man in the street. You can believe the story, or not, just as you please. According to a fairly popular belief, this is a free country where a man can accept or reject any information that does, or does not appeal to him. I have read stories in newspapers that would strain the credulity of at least two strong men—."

"I know," I said. "I know. And on the other hand you and millions of others have read stories and swallowed them hook, line and sinker in many instances for no other reason than because they happened to fit in with some of your own wishful thinking. You can omit the introduction, the comments, the frills and furbelows and spill this story which apparently is fizzing and bubbling in your system. I make no promise that I am going to believe it, or not believe it, but I am willing to listen and that is about as fair an offer as you might expect under ordinary conditions. In fact I might go further and claim it is an evidence of true friendship—and—er all that kind of thing. In other words what are we waiting for?"

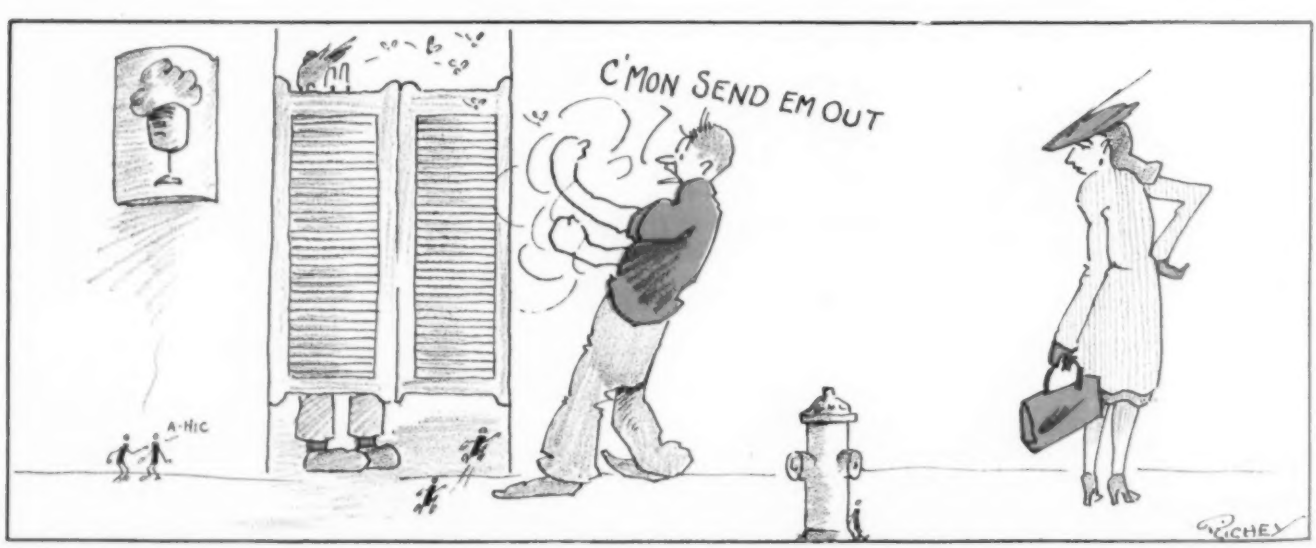
"What are we waiting for? I'll tell you what we are waiting for. We are waiting for you to clap a stopper on the jaw tackle and that is what we are waiting for. Your totally uncalled for remarks have only one redeeming feature. They indicate a consuming desire on your part to hear the story, but your old maidish complex forces you to put up a bit of a struggle."

I might have countered with a haughty and scornful 'Ha' or 'Sez you', but before I could decide which of these would prove the most effective Bill continued.

"Now that you are in a properly receptive mood," he said, "ears cocked at the proper angle, hands folded, breathing well under control, eyes shining in expectancy and feet all ready to stamp approval, I shall recite *The Story of Little Sammy and the Bartender* in my usually brief and concise manner. A tidy and orderly person, I do not waste words. Without mentioning any names, I greatly deplore this aggravating and pernicious habit on the part of other people.

"This here little Sammy was a character whose only consuming ambition was to drink all the alcoholic liquor in town. He never worked or had any visible means of support and therefore never had any money, but over a long period he had developed many clever and ingenious tricks for getting his share of the stuff that popularly is supposed to bite like an adder and sting like a serpent.

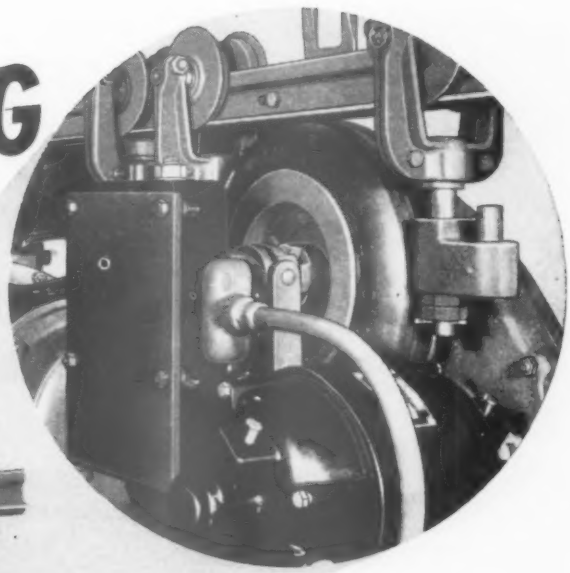
(*Continued on page* 208)

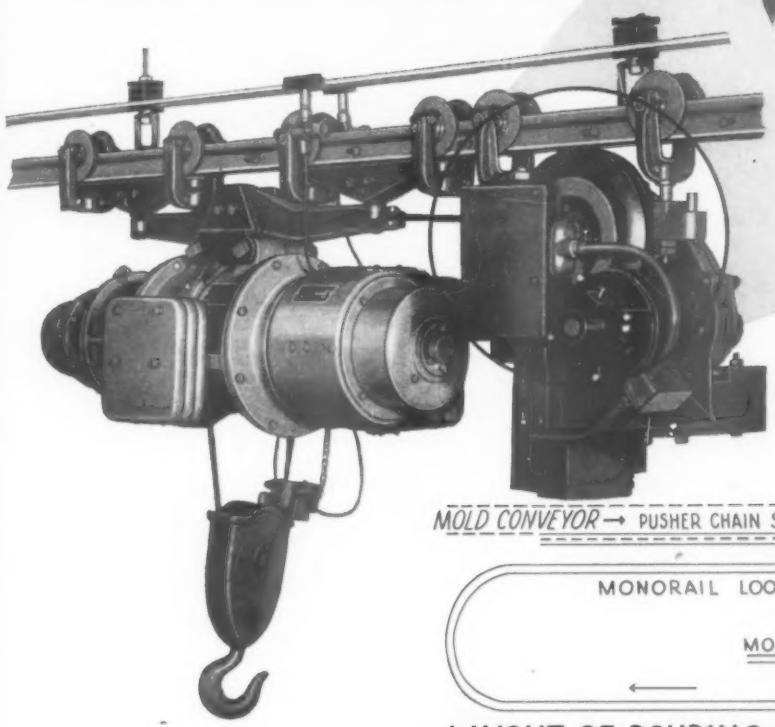


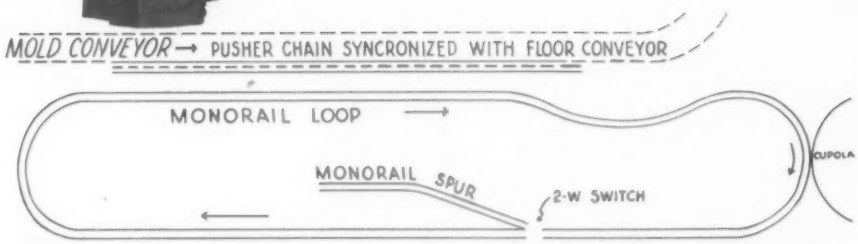
After this terrific battle he takes a place in the Hall of Fame with Superman, Tarzan and Mickey Mouse

FASTER POURING

with "Free-Wheeling" AMERICAN MONOTRACTOR







LAYOUT OF POURING LOOP FOR CYLINDER HEAD LINE

Here is another example of American MonoRail engineering with the American MonoTractor.

A rubber drive wheel propels a heavy bull ladle from the cupola to floor conveyor carrying flasks. When the unit reaches the pouring area, clutch disengages the MonoTractor drive wheel so that carrier unit can be picked up by an overhead pusher and moved along over the flasks at the same speed as the floor conveyor.

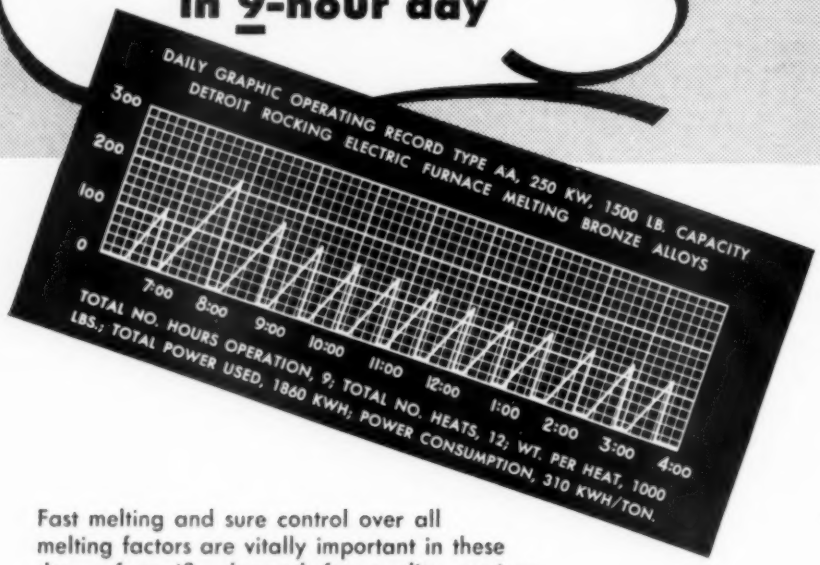
This enables the operator to concentrate all efforts on pouring. No worry about "keeping up" or "getting behind" the flask—operator forgets about horizontal movement and is able to pour metal faster and more accurately.

This principle is applicable to many conveyor lines for process in motion. Let an American MonoRail Engineer go into further details.

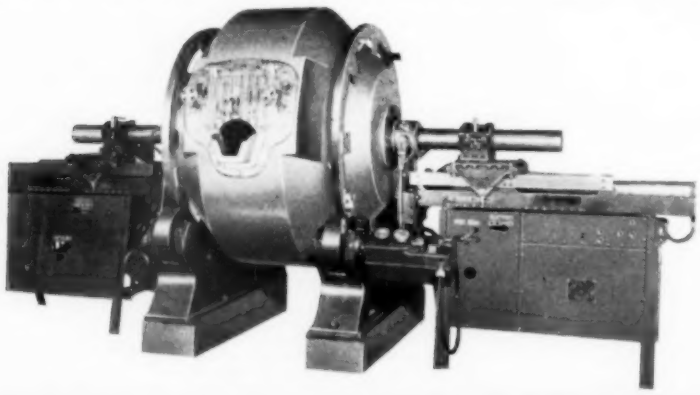
THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

DETROIT ELECTRIC FURNACE TYPE AA
Uses only 1860 KWH to melt 6 tons of bronze alloy in 9-hour day



Fast melting and sure control over all melting factors are vitally important in these days of terrific demand for quality castings. Detroit Rocking Electric Furnaces insure both—plus!—ease and economy of operation that help hold down production costs. For example, consider this daily operating record of a Type AA, 250 Kw, 1500-lb. Detroit Electric Furnace. In 9 hours' operation, this furnace melted twelve 1000-lb. heats of bronze alloy at a total power consumption of only 1860 Kwh. That's 6 tons of definitely superior metal —produced under non-oxidizing conditions where melting time and temperature were precisely regulated by one man at the controls in the stationary pedestal—and only 310 Kwh. used for each ton! You can attain similar efficiency in melting ferrous and non-ferrous metals in your plant with the correct type Detroit Electric Furnace. Send us your melting requirements and we will make specific recommendations.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 206)

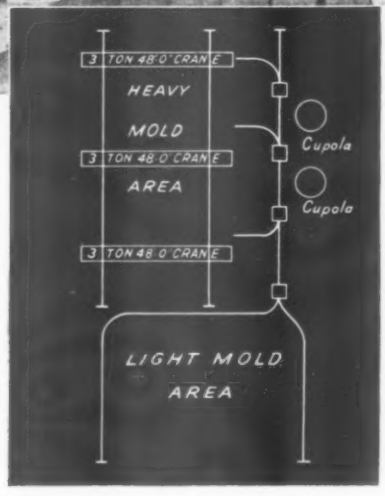
You know it is a funny thing how that saying has persisted in our language, when it is a matter of common knowledge that adders do not bite and serpents do not sting. Well, anyway, little Sammy bravely risked all this stinging and biting every time the opportunity presented to—as he often declared cheerfully and nonchalantly—spill the old stuff down the rat hole.

"He was called Little Sammy because when he walked or stood with a perpetual stoop his nose was only about 4 ft above the — well, whatever he happened to be standing upon at the time. Gentlemen of leisure calmly sipping the stuff that stings and bites, etc., in resorts maintained for the purpose by great hearted and philanthropic citizens, occasionally laid small wagers on Sammy's problematical height. Heated arguments arose on whether he should be measured as is from the top of his head to the ground, or should he be straightened out in some manner and then properly measured from end to end. These arguments were conducted as freely and completely, although perhaps a trifle more noisily—if there is such a word—as the arguments presented by deep and learned scientists over the difference between the magnetic and the true and geographical north.

"At various times suggestions were offered for measuring Sammy. Many of these suggestions were marked more with a crude and earthy sense of humor, than with practical features. One suggestion that met with almost universal favor was to hang Sammy by a chin strap from the hook of a crane. Another suggestion advanced by a rough individual connected with the foundry industry was 'To hit Sammy a belt on the puss and lay him out flat on the ground where he could be measured easily and accurately from end to end.' Just to make things easy all around he offered to do the job himself any time or any place. He also would do the measuring. To emphasize this important point and also as an evidence of good faith and reliability he dragged a long zig-zag rule from his hip pocket. He admitted it was burned in spots, and here and there the figures were obliterated from an application of saliva and rubbing the face against the hip of a pants heavily impregnated with coal dust, sand, blacking and paste. However, he claimed the 6-in. joints could be counted and the graduations in the last section could be guessed at with a reasonable degree of accuracy.

He also claimed that if he had a suitable tensile testing machine he could stretch the little bum at least 6 in., of course with a corresponding reduction in

(*Continued on page* 210)



FOUNDRY SYSTEM SPEEDS PRODUCTION . . . and PAYS for itself

A careful check of all costs revealed that the entire Cleveland Tramrail materials handling system in the foundry shown above paid for itself in less than one year.

Because the equipment speeded production and improved plant efficiency, costs were lowered considerably. The savings thus effected more than paid for the sytem the first year.

The equipment is of the hand-propelled type and includes three 48-foot cranes, a 200-foot runway and other trackage, switches, hoists and carriers.

The cranes serve the heavy mold area. Hot metal is conveyed directly from cupolas to molds in this section. In the light mold area the metal is transported on the overhead rail sytem and transferred into hand pouring ladles for distribution.

Hundreds of foundries are speeding production and profiting from installations of Cleveland Tramrail.

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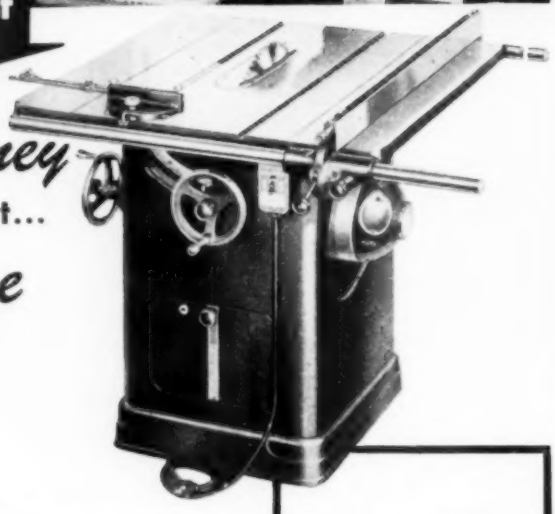
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Pattern makers everywhere turn out large and small jobs quickly, easily, and accurately with the Delta Unisaw.

In your pattern department



Save Money
on your equipment...
Save Time
on your sawing operations . . .
with a
DELTA UNISAW*

You save on your initial investment . . . save time and money on your pattern production—with the Delta Unisaw.

Here's a heavy-duty tilting arbor circular saw that makes a 3 1/8" cut with a 10" blade. Famous Delta design and construction features help assure speed and consistent accuracy . . . and permit easy adjustment, for quick changes from one job to another.

For results that reflect credit on your choice, equip your pattern shop with Delta Unisaws. Consult your Delta distributor. Find his name under "Delta-Milwaukee Tools" in the classified section of your telephone directory.

Send coupon for catalog B-15 which pictures and describes the Unisaw and other low-cost Delta tools.

Features of the Delta Unisaw:

Big capacity (table is 20" x 27"; with wings, 36" x 27") . . . Space of 12" in front of blade . . . Cuts to center of 50" panel . . . Rips stock full 3 1/8" thick . . . True-running arbor . . . Lubricated-for-life ball bearings . . . 3-belt drive . . . Double-face, double-lock rip fence . . . Patented Auto-Set miter gage . . . Accurate calibrations on settings . . . "Point-of-use" controls and locks . . . Fully-enclosed motor . . . Rigid cabinet base . . . Streamlined base . . . Many other Delta advantages.

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DELTA MILWAUKEE REG. U.S. PAT. OFF.
Delta Manufacturing Division
Rockwell Manufacturing Company
Milwaukee 1, Wisconsin
ROCKWELL DELTA

(*Continued from page 208*)

area at or near the vicinity of the belt buckle. This suggestion was voted down unanimously. Any reduction in area naturally would reduce the holding capacity on the inside, and a corresponding reduction in Little Sammy's pursuit of life, liberty and happiness, guaranteed him by the Constitution of this Great Republic. Recognizing the enormity of the error into which his enthusiasm had led him, the proposer gracefully retracted his suggestion. His patriotic standing was fully re-established when he invited all hands to join him in a round of the stuff that bites and so forth."

"Is that the end of the story?" I inquired hopefully.

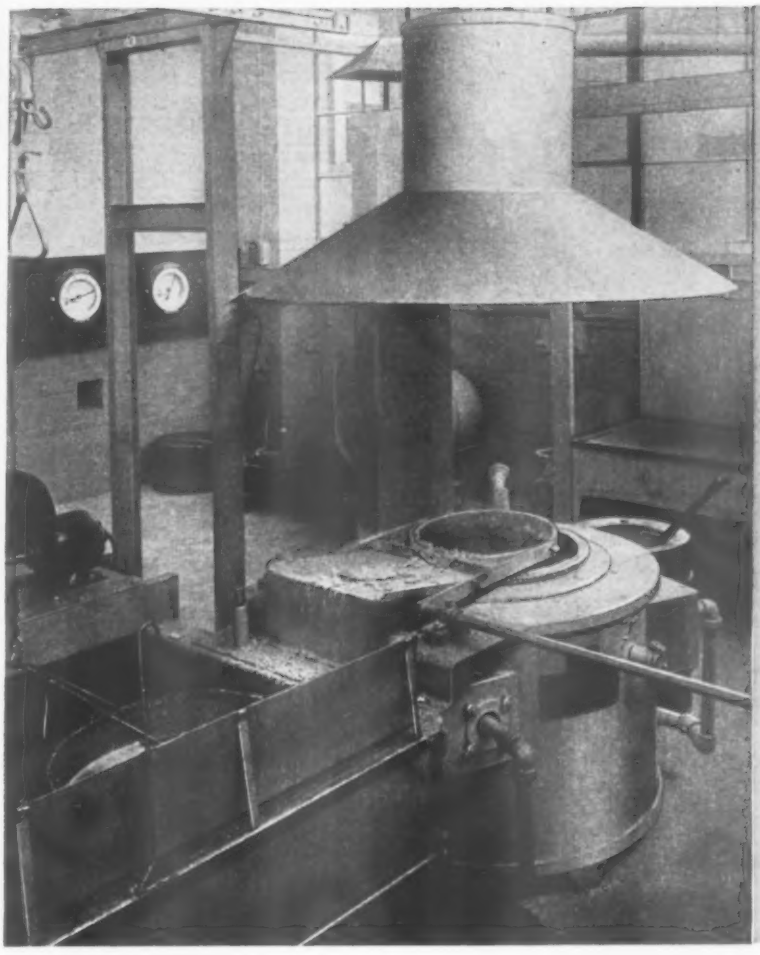
"Nota-tall," Bill said. "Not a-tall. That is just the beginning or, as you might say, the introduction. A kind of a blueprint or set of specifications before you start laying out the pattern.

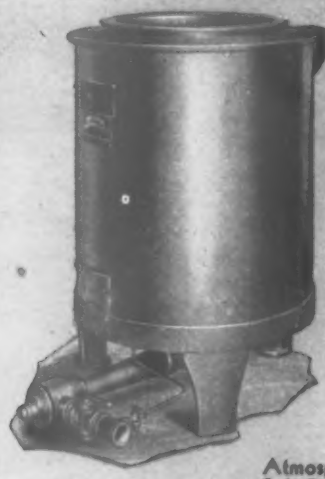
Egad! He's stuck with the story

"Sammy made the rounds one morning recently, but he might as well have journeyed through the hot and blistering sands of the great Sahara desert in search of a drink. Nobody could or would stand him a drink. They did not care, he reflected bitterly, if he should fall down right there and expire on the sidewalk. For a while he toyed with the idea of stumbling and falling in the hope that some good Samaritan might be tempted to revive him by forcing a gill or two of the Stuff between his pallid lips and not too tightly clenched teeth. He reluctantly abandoned the idea when he saw a cop giving him the eye from across the street.

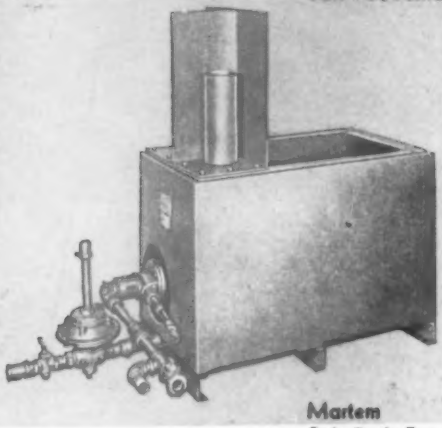
"Finally he crept into Red Mike's Place and asked that honest and solid citizen for a drink. Mike kept right on polishing the bar with a wet rag and shooing the swarm of flies flying and buzzing and otherwize enjoying themselves in their

(*Continued on page 212*)





Atmospheric
Salt Pot Furnace

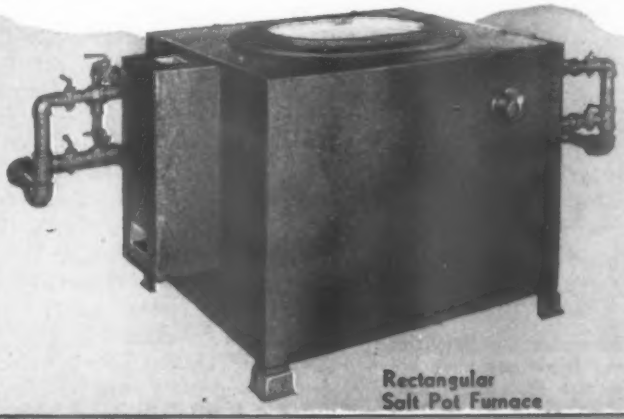


Martem
Salt Bath Furnace

For Your Salt Bath Requirements . . .

A FURNACE THAT *Exactly* MEETS EACH NEED

No matter what your salt bath requirements may be, you'll find McKee Eclipse offering a furnace that fits these requirements in an ideal manner—a furnace that's "just right". Study the furnaces shown in this ad. Let our engineers work with you in determining the salt bath equipment that's exactly right for high production and low unit cost. Write for information. Represensatives in all principal cities.



Rectangular
Salt Pot Furnace

Circular
Salt Bath Furnace

Eclipse Fuel Engineering Company
ROCKFORD **ILLINOIS**

McKee Eclipse

The WORK of a GIANT

• Within these walls a giant stands ready to work for you. Giving him no thought at all, you touch the control button. At your command his mighty muscles go into action and the load moves.

The operating mechanism of Shepard Niles hoists is completely enclosed, assuring permanent alignment—more durable, trouble-free, efficient service. Whatever your lifting or handling requirements may be, there's a Shepard Niles hoist for the job—more than 5,000 types and sizes.

Powerful and rugged, Shepard Niles Cranes are available in any desired capacity and span—designed to handle greatly varying loads with precision, safety and economy. Shepard Niles Cranes have the same sound, progressive features as do the Shepard Niles Hoists. A request will promptly bring illustrated bulletins.

Shepard Niles
CRANE & HOIST CORPORATION

The experience and facilities of Shepard Niles engineers are at your service. Plan ahead now for the right material handling equipment. Your inquiry will receive prompt attention.

360 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

(*Continued from page* 210)

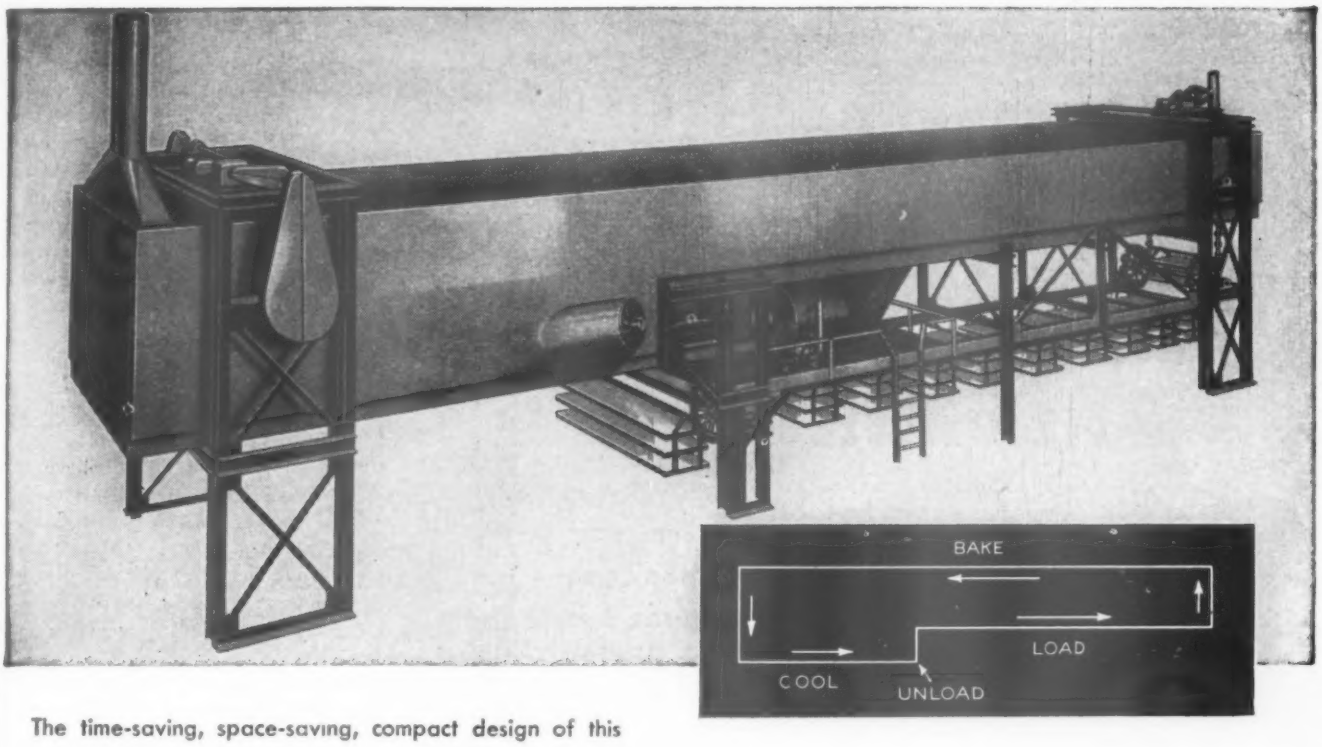
usual happy and carefree manner. At Sammy's third or fourth feeble request Mike turned a fishy eye in his direction and asked him coldly if he had the price. Sammy admitted that at the moment he was financially embarrassed, but if his good friend, his dear friend Michael, would bestow the priceless boon of a drink, he would return on the following day and cheerfully recompense him for his hospitality. On the other hand if he did not get a drink he was quite convinced he would fall on the floor and pass out in great agony. Lifting his ragged hat reverently, he called upon his sainted mother to witness the truth of all his statements and promises.

"Red Mike calmly wiped the bar and chased the flies. Leaning one elbow on the bar while idly manipulating the rag with the other hand, he directed a nice flow of conversation from the corner of his mouth and in Sammy's general direction. His remarks, interlarded with references to the Deity and to various bodily functions, could be presented in the highest class magazines and works of fiction and in some high class plays on the stage, but—well maybe I am old fashioned. Let it go.

"In a free and expurgated translation he intimated that in his opinion Sammy was a very undesirable character, a little weasely sponger, cheat and liar. He never had any money and never would have any, tomorrow or any other day. He himself, Red Michael that is, was not in business for fun or for his health. He bought and paid for his liquor and sold it at a reasonable profit. So far as Sammy dying for want of a drink, he said that was all to the good. The only regret he had was that Sammy had not thought of it years before. He did not want Sammy to die in his place. 'Don't you dare die around here, you little crook' sez he. 'I don't want the job of shoveling up the remains and throwing them in the swill barrel in the back yard. One of my customers feeds that swill to his pigs and I would not like to see the pigs poisoned.' He advised Sammy to keep his fat on and not try to spring any of that old sainted mother stuff. In his perfectly candid opinion Sammy never had a mother. He was glad in a way Sammy had not mentioned a father. He could say a few words about that. He concluded by asking Sammy politely if he intended to shoot through the door under his own power, or should he assist him with a few light taps from a bung starter. He assured him it would be a pleasure and if he never saw him again it would be too soon.

"Accustomed all his life to the slings and arrow of outrageous fortune — I wonder if I have that quotation right—

(*Concluded on page* 214)



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

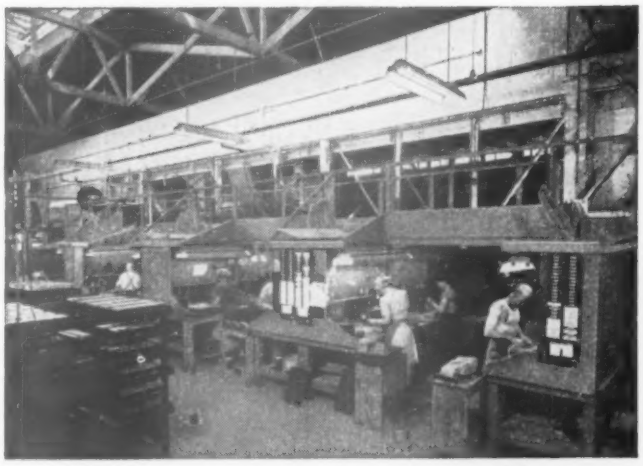
The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!



MEMBER FOUNDRY EQUIPMENT MANUFACTURER'S ASSOCIATION, INC.

YOUNG BROTHERS COMPANY

6508 MACK AVENUE DETROIT 7, MICHIGAN

YBCo ESTABLISHED IN 1896

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

FALLS TITANIUM ALUMINUM

When added to aluminum-copper and aluminum-silicon alloys will dissolve readily at ordinary foundry melting temperatures. It has a favorable influence on the grain-size and structure and will promote the following properties:

. . . Increase tensile strength and ductility.

. . . Increase fluidity.

. . . Increase resistance to pressure so that castings will hold liquids without leakage.

. . . Improves polished and machined surfaces due to decreased sub-surface pinholes and porosity.

"Falls" Titanium Aluminum, produced in most convenient size ingot for weighing small quantities, is recommended for addition to molten aluminum alloy just before it is poured into the mold.

Write To Us For Detailed Information

NIAGARA FALLS
Smelting & Refining Division
Continental-United Industries Co., Inc.
BUFFALO 17, NEW YORK

(*Concluded from page 212*)

well, anyway, Sammy sat there and took it all without blinking an eye. The same little glazed eyes noted the swarms of flies, also Mike's futile attempt to get rid of them. The germ of a very clever idea began to sprout in his mind. With the gambler's instinct to throw everything on the last card he put on what he considered an ingratiating smile and addressed the Red fella in the following words:

" 'Listen, Mike and I'll make you a little proposition. You give me a drink and I'll kill every fly in the place. How's that? What do you say?'

" 'Well,' sez Mike, 'I don't believe it can be done. Even if it could be done I don't believe you are the man to do it. However, even an attempt is better than nothing and them flies certainly have almost driven me crazy. Besides one drink does not amount to much one way or another. Here y'are. Now let's see you do your stuff.'

"Sammy grabbed the glass and spilled the contents where he thought it would do the most good. The subsequent biting and stinging features were ignored cheerfully and tee-totally. He smacked his lips and walked out to the sidewalk. Here he turned toward the doorway and rolled up his sleeves. Then he doubled his fists, bent his arms to the shape and position approved by all fistic heroes of the squared circle and danced toward the doorway on the balls of his feet.

" 'All set now Mike,' he yelled as loudly as his squeaking voice permitted. 'Bring 'em out now, one at a time and watch me knock 'em off!' Mike threw the bungstarter at him, and missed."

Announce Acid Open Hearth Officers

Beginning its fifth year of activity, the Acid Open Hearth Research Association has announced the election of the following officers for the ensuing year: President, J. L. Nichols, American Locomotive Co., Latrobe, Pa.; vice president, Francis B. Foley, Midvale Co., Nicetown, Pa.; secretary, F. C. T. Daniels, Mackintosh-Hemphill Co., Pittsburgh; treasurer, A. R. Altman, Heppenstall Co., Pittsburgh; and director of research, Dr. G. R. Fitterer, University of Pittsburgh.

Among the association's activities has been the introduction of a furnace control method which guarantees uniformity in temperature and quality of steels from heat to heat with accompanying reduction in time and cost. The present progress of studying the influence of methods of charging, composition of the charge together with oxidation and deoxidation is expected to effect equally valuable results.

A USER *Writes* AN ADVERTISEMENT!

SHELL FILLINGS
ELBOW BARS
SPIRAL BARS
RAISED DIAMOND BARS
TWIN SPIRAL BARS
INVERTED DIAMOND BARS

THE BAHR BROTHERS MFG. CO.
MAKERS OF
POSITIVE JORDAN SHELL FILLINGS AND PLUGS
ALSO THE BAHR CENTRIFUGAL DISC REFINERS
MARION, INDIANA, U. S. A.

THE PLUGS
STRAIGHT BARS
SPIRAL BARS
RAISED DIAMOND BARS

Jan. 31, 1946

Certified Core Oil & Mfg. Co.,
3308-26 So. Cicero Ave.,
Cicero, Ill.

Gentlemen: Attention: T.G. Waugh, Mgr.

Replying to your inquiry of Jan. 29th, regarding the use of your Core Oil in our Foundry.

We use large numbers of heavy ram up Cores in all of our production, and we have been using your Core Oil for a number of years, and will say that the oil as furnished by your company is always uniform in quality.

The Coremakers are very well satisfied with the way the oil works in our Core Boxes.

The oil bakes uniformly and in a very short time in our ovens, and smoke and gases are very low when pouring.

Prompt shipments of oil to meet our requirements were of great service to us in keeping up our production schedule during the trying days of the War just past, and we assure you that this prompt service was very much appreciated.

Yours very truly
THE BAHR BROS. MFG. CO.

CAB:c

By Chas. A. Bahr.
President

Part of the Core-room at The Bahr Brothers Mfg. Co. Foundry at Marion, Ind., showing typical cores made with Certified Core Oil.

Nothing need be added to the message above to make it complete — except to note that this expression from a nonferrous foundry is no "first impression." As Mr. Bahr states: "We have been using your Core Oil for a number of years." Certified Core Oil stands the test of time in any foundry because of its constant uniform quality.

Knowing your conditions, we are prepared to prescribe the proper grade of Certified Core Oil which will give you equal satisfaction to that expressed above.

Tell us the grade and number of the core oil you use, its color, the type, grade and mesh of sand you use, and your oven conditions. Without obligation, our laboratory will prescribe the ideal core oil.

CORE OILS
SOCONY-VACUUM

CERTIFIED CORE OIL DIVISION
SOCONY-VACUUM OIL COMPANY, INC.

3308-26 South Cicero Avenue, Chicago 50, Illinois.

Stock and representatives:

Buffalo, N. Y.; Elmira, N. Y.; Worcester, Mass.; Bloomfield, N. J.; Reading, Pa.; Newtown, Ohio; Milwaukee, Wisc.; St. Louis, Mo.; Minneapolis, Minn.; Birmingham, Ala.; Houston, Tex.; Denver, Colo.; San Francisco, Calif.; Portland, Ore.

Make This **DUST HOG**

Pay His Own Board

The majority of users of Pangborn dust control equipment say their systems practically pay for themselves due to reclamation of dust by-products.

Even if your plant's dust is worthless, it pays to keep DUST HOG from devouring profits—interfering with worker efficiency, helping wear out equipment, soiling finished goods, causing accidents.

A free booklet, "Control of Industrial Dust," tells how to eliminate costly "dust pockets". Write PANGBORN, 300 Pangborn Boulevard, Hagerstown, Maryland—*world's largest manufacturer of dust control and blast cleaning equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

VENTING POWER OF GREEN SAND MOLDS

(*Continued from page* 85)

and distribution of this sand is shown in Figs. 7 and 8. This sand is used for cores and molds.

No effort has been made to hold the backing sand permeability to any fixed ratio to the facing. Experience with differences of 25 points in permeability, either above or below the facing sand, has given assurance that there is no need for concern if the backing falls below the facing. By using a relatively fine all-purpose sand, the use of silica flour has been eliminated in all but heavy metal core mixtures. Elimination of silica flour from the sand mixtures makes fines removal from the used sand less necessary.

In view of the low pressures experienced in the cope of the test piece illustrated in Fig. 4, the justification of cope venting normally employed is questionable. Fig. 9 illustrates the type of venting under discussion. Such venting is employed to prevent misrunning and entrapped gases. For approximately the last two years none of the castings made at the Dodge Steel Co. have had vents. Venting, as illustrated in Fig. 9, serves no useful purpose, while it does increase costs and frequently causes defects.

Temperature Is Important

The runnability of a given metal is, to the writer's knowledge, in no way influenced by mold gas back pressure within the limits of sands and molds tested. While various factors can influence runnability or fluidity, as reported by Taylor, Rominski and Briggs ("The Fluidity of Ingot Iron and Carbon and Alloy Cast Steels," AFA *Transactions*, 1941), the temperatures of pouring and the methods of gating are the most potent factors to be considered. Experiments conducted on thin-sectioned castings which were found to be difficult to run indicated that mold venting was no aid.

The cope side gas bubble, so frequently found in small steel castings, has been the subject of a long and tiring research program at the writer's company. Venting is a useless instrument as a tool of elimination. The radiograph of Fig. 10 shows an example of such gas holes. This defect can take varied forms, but generally it is found under a solid skin of metal in the cope side of the casting, and is spherical in shape except on the top, where it is generally flat. Most often it is bright on its inner surface and contains a relatively small amount of solid matter at the bottom of the crater.

(*Continued on page* 218)

The right oven for your work pays dividends in maximum production and lower costs!

There's a time-proven

CARL-MAYER OVEN

for every foundry need

Those in charge of production in America's leading foundries know their responsibility. To insure fast core baking, uniform core baking with operating economy, Carl-Mayer oven equipment is chosen repeatedly.

Want the users' verdict? We'll gladly arrange contact with customers in your locality. *Write for Bulletin.*

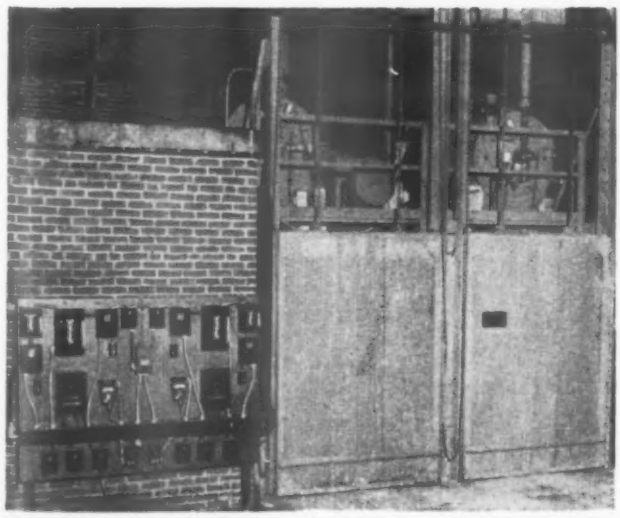
RACK
CAR
SHELF
(Quick Dry)
PORTABLE
DRAWER
VERTICAL
MONORAIL
AND
HORIZONTAL
CONVEYOR
TYPES

CARL-MAYER VERTICAL CORE OVEN in brass foundry of The H. B. Salter Co., Marysville, Ohio, manufacturers of heating and plumbing fixtures.

CARL-MAYER MONORAIL CORE OVEN at Packard Motor Car Co.

IMPORTANT CONCERNS LIKE THESE HAVE CHOSEN CARL-MAYER OVENS:

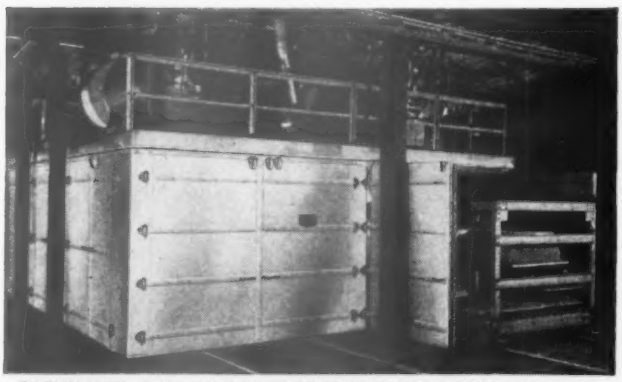
Aluminum Co. of America
American Radiator Co.
Brown Industries
Bucyrus-Erie Co.
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
H. B. Salter Co.
Shenango Penn Mold Co.
Studebaker Corp.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.



Two Recirculating Oil Fired Double Rack Type Core Ovens with Lift Doors, as installed for The Crucible Steel Castings Co., Lansdowne, Pa.

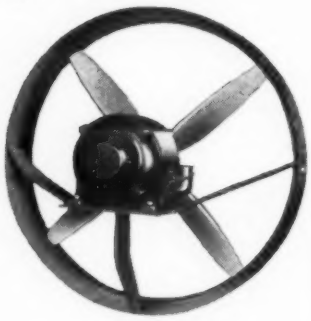
THE CARL-MAYER CORPORATION

3030 Euclid Av., CLEVELAND, OHIO



CARL-MAYER TWO COMPARTMENT CAR TYPE OVEN for cores and molds. Also has doors on side permitting its use as a rack type oven.

"Like Modern Aircraft Wings"



...BOTH Blade Surfaces Work in PROPELLAIR Airfoil Fans

Good foundry ventilation means just one thing, *air movement*—powerful suction; strong exhaust; high capacity. That's why double-action Propellairs are doing such marvelous jobs. They *pull* even more than they *push*.

REAL AIR MOVEMENT. Like modern aircraft wings, Propellair fan blades have *thickness*. And just as thickness creates powerful suction to give wings the greater part of their "lift," so does the *pull* of these airfoil blades account for more than half of total air movement. But that's not all! Scientific variation of camber, chord, and pitch compensates for the difference in linear speeds of points at various radii. The *whole* blade works—not just the tip—for *uniform* air velocity.

IMPROVE YOUR FOUNDRY EFFICIENCY. Propellair fans remove action-slowing smoke, unhealthful fumes, and much of the dust inherent in foundry operation. They make your foundry a good place to work. This modern ventilation is all-season economy—pays for itself over and over again. Write for whole story.

"MOVING AIR IS OUR BUSINESS"

PROPELLAIR, Inc.

SPRINGFIELD · OHIO

(*Continued from page 216*)

This solid matter may be in the form of fine white powder, granules of which appear to be sand, or actual fused slag of light green to black color. These holes are generally found in the cleaning room during chipping or grinding near vents, or are found by inspection with sharp pointed hammers, which when used as probing tools will pierce the thin membrane of solid metal above the bubble. Generally the defect is associated with some individual casting design, and is found most often in light-sectioned castings. Most castings having this defect will pass visual examination but will be found defective by radiography. While hundreds of test pieces have been cast and radiographed over the past three years by the Dodge Steel Co. laboratory staff, no satisfactory solution has been found. Some generalizations can be made:

1. Any given design which includes sprue and gate will exhibit its own frequency of defects.

2. Changes in gating a given design will often alter the location or frequency, or both, of the defects.

3. Characteristics of the molding sand, whether coarse, fine, dry, damp, organic or inorganically bonded, high or low strength, washed or unwashed, exhibit little influence.

4. Small castings exhibit greater frequency than large castings.

5. Deoxidation practice has a marked influence. Large additions of aluminum to the metal will eliminate the defect from the most stubborn designs. The amount of aluminum required will vary, depending on the numerous conditions favorable to oxidation of the aluminum.

The writer stated earlier that overemphasis on unnecessarily high permeabilities and low moistures is harmful. This statement is made on the writer's observations in many steel foundries where unnecessarily coarse sands are loaded with silica flour or washed to prevent metal penetration and burning on. The writer is unable to say how large a casting can be made in unwashed molds, but if a dense mold face is obtained by hard ramming of fine grain sand, metal sections of 4 to 6 in. and castings weighing up to 4000 lb can be made without mold or core washes. It has been some five years since mold washes were used at the writer's plant where sections and weights up to the above figures frequently are cast. The elimination of core and mold washes has resulted in materially reducing costs and has aided in procuring more uniform quality.

The title of this article, "How Much Venting Power Must Green Sand Molds Possess?" has not been answered. The writer is unable to answer other than to

(*Concluded on page 220*)

Quality with Economy

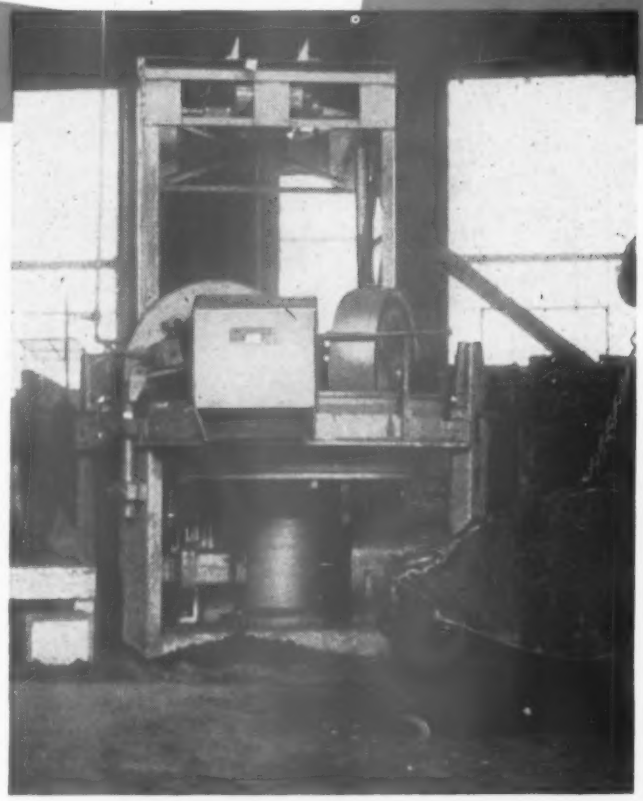
a feature of

the CLEARFIELD MIXER

A constant striving for Balanced Tempering at minimum cost—this is the object in every sand preparation operation. It solves the all important problems of finish and dimension tolerance without abnormal expense.

In preparation of sand for molds for ferrous and non-ferrous castings the Clearfield has proved itself the ideal mixer both in quality and economy. Its economy rises from the revolving pan keeping all the sand in motion all the time. From the same revolving pan come the tempering results to be desired . . . a coating of bond is kneaded onto the entire surface of every grain of sand, moisture is distributed evenly through the entire batch, temperature is kept low and even reduced where sand is hot from a former mold. The result is maximum quality at minimum cost.

The Clearfield story is in our catalog. Write for your copy.



Gray iron molding sand in large valve foundry is kept in condition by mulling in a Clearfield 610 Mixer.

The four Clearfield Mixers . . . Nos. 404, 610, 920 and 930. Capacities range from 4 cu. ft. to 40 cu. ft. per batch.

CLEARFIELD MACHINE COMPANY

CLEARFIELD PENNSYLVANIA, U. S. A.

LASTS LONGER... WITH LESS AIR

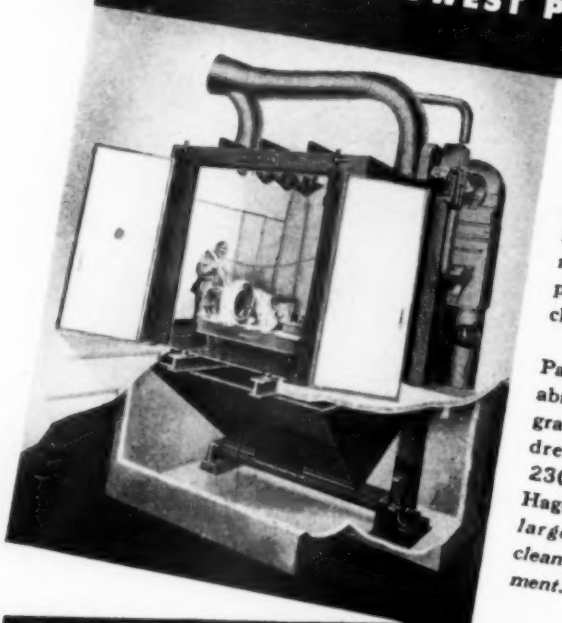
1500 hours is the guaranteed service life of the Pangborn Norbide* Nozzle used with metal abrasive. Such long life is due to a liner that is made of boron carbide — the strongest, hardest, most abrasive-resisting substance ever made for commercial use.

Air consumption is reduced 10 to 20% as compared with iron nozzles and blasting efficiency is improved because stream contour and abrasive velocity are maintained.

No other nozzle will out-perform a Pangborn-Norbide. Pangborn Corporation, 2300 Pangborn Boulevard, Hagerstown, Maryland.

*Trademark of Norton Co. for boron carbide

NOW... MEDIUM AND LARGE METAL PARTS CLEANED AT LOWEST POSSIBLE COST



From a simple enclosure to retain dust and flying abrasive, the blast cleaning room has evolved into Pangborn's mechanical system for high-production, low-cost metal cleaning.

Catalog 400 describes such Pangborn features as mechanical abrasive recovery and pneumatic gravity abrasive separation. Address Pangborn Corporation, 2300 Pangborn Boulevard, Hagerstown, Maryland — *world's largest manufacturer of blast cleaning and dust control equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

(*Concluded from page* 218)

say, considerably less than is being generally used. The advantages of finer sands are worth seeking. While a solution to the porosity problems has been found in the use of aluminum in the metal, such a solution is not altogether satisfactory. Aluminum as an alloy to steel alters some of the metallurgical characteristics of the metal, making it undesirable. This is particularly true in high-temperature service where high creep strength and structural stability is so much desired. It is to be hoped that work will continue in an effort to solve porosity by means other than aluminum.

Laboratory sand tests used to control desirable mold properties can be most useful, providing the user knows what he needs in the mold. We are woefully lacking in knowledge of what we need, while generously endowed with opinions which are probably erroneous.

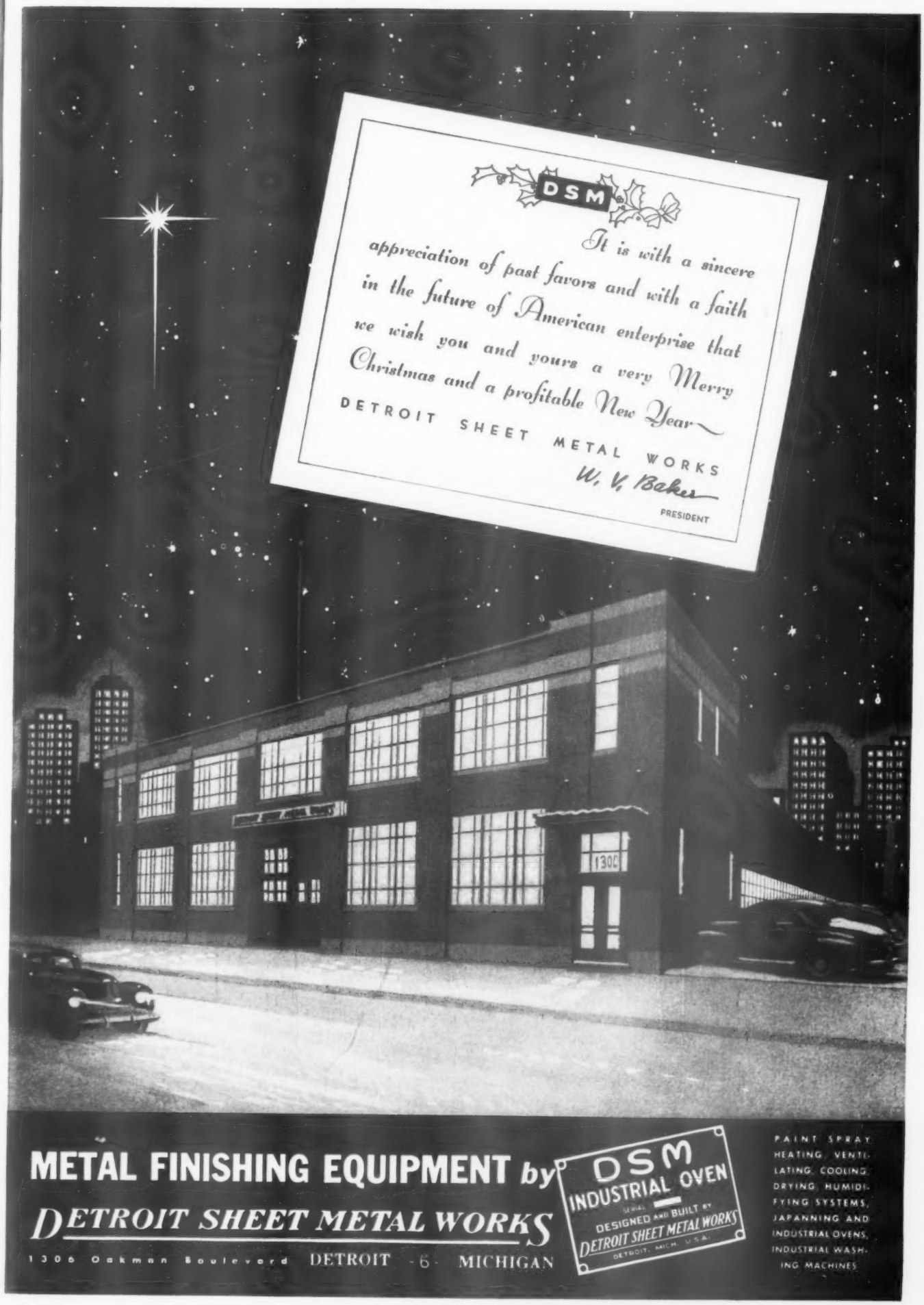
The writer would like to thank the staff of the Dodge Steel Co. for its unstinted co-operation and suggestions which made possible the many large-scale and laborious tests from which this article was abstracted.

Forms New British Engineering Firm

Engineering business of H. A. Brassert & Co. Ltd., London, England, has been transferred to a new company which has been formed under the name of John Miles & Partners (London) Ltd. The new company, which is retaining the services of the engineering staff of H. A. Brassert & Co., has the following directors; John Miles, chairman and managing director; T. Thomson; A. G. E. Robiette, J. R. Thring, secretary; and T. Rudkin. H. A. Brassert, former chairman of the British company which bore his name, will confine his activities to his company in New York.

Gray Iron Founders Pick Committee

George Johnstone, president and general manager, Lawrence Foundry Co., Grove City, Pa., has been appointed chairman of the Gray Iron Founders' Society's technical committee. Other members of the committee are: R. A. Flinn, American Brake Shoe Co., Mahwah N. J.; Harry W. Dietert, Harry W. Dietert Co., Detroit; J. D. Judge, Hamilton Foundry & Machine Co., Hamilton, O.; J. S. Vanick, International Nickel Co., New York.


DSM
It is with a sincere appreciation of past favors and with a faith in the future of American enterprise that we wish you and yours a very Merry Christmas and a profitable New Year
DETROIT SHEET METAL WORKS
W. V. Baker
PRESIDENT
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METAL FINISHING EQUIPMENT by
DETROIT SHEET METAL WORKS
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DETROIT, MICH. U.S.A.
PAINT SPRAY
HEATING, VENTILATING, COOLING, DRYING, HUMIDIFYING SYSTEMS, JAPANNING AND INDUSTRIAL OVENS, INDUSTRIAL WASHING MACHINES

Industry BRIEFS

BEARDSLEY & Piper Co., Chicago, has purchased the Flask Lifting Machine Division of the Champion Foundry & Machine Co., Chicago, according to Harry Schlichter, sales manager of the former company. Patterns, drawings, patent rights and the right to continue use of the Champion name have been transferred to Beardsley & Piper.

• • •

Phillips Foundry Co. Inc. has taken over the former Haberfelde Steel Co. plant in Bakersfield, Calif., and is engaged in the production of plows and other farm implements, including replacement parts and steel castings of various kinds. Present owners include: H. D. Phillips, president; W. J. Phillips, executive vice president; Charles N. Phillips, works manager; Ed Romanski, vice president in charge of engineering; P. J. Boyer, vice president in charge of production; and W. J. Gates, secretary-treasurer.

• • •

New plant of Boyack Industries Inc., recently constructed in South Bend, Ind., and operated by Charles J. Boyack, has begun production of aluminum die castings and permanent mold castings. William Crump is foundry superintendent.

• • •

L. Weaver Foundry, Noblesville, Ind., has completed construction of its new foundry building which will increase production facilities for brass and aluminum job work. Lonnie Weaver owns and operates the foundry.

• • •

City Pattern & Foundry Co., South Bend, Ind., has recently completed its new foundry building in the 2700 block on West Sample St. L. F. Tucker is president and George E. Garvey, plant superintendent of the company.

• • •

Industrial Pattern Shop Inc., 1635 East Slauson Ave., Los Angeles, has obtained building permit for a new pattern shop, 50 x 110 ft, to cost about $18,000.

• • •

Electrical Mfg. Co., Huntington, W. Va., has received a charter to manufacture aluminum, brass, bronze and steel castings and fittings, and to make electrical resistances, terminals and contacts. Incorporators are Clayton Orner and William C. Piper, Wheeling, W. Va., and Jesse W. Coughenour, Pittsburgh.

• • •

N. Ransohoff Inc., Cincinnati, has had a change in ownership, controlling interest having been purchased by John R. Strauss, who will engage in the active management. The company was organized in 1916 and produces metal cleaning machinery. Officers of the company are: Nathan Ransohoff, president, who will devote his entire time to engineering and development; Mr. Strauss, vice-president and treasurer and Richard C. Wigger, secretary and general manager.

• • •

Central Pattern & Foundry Co., 3737 S. Sacramento Ave., Chicago, is changing its name to Central Aluminum Castings Corp. as of Jan. 1. Charles Zint, vice president, who recently toured Mexico, states the company is considering construction of an aluminum castings plant on the outskirts of Mexico City.

• • •

Aluminum Alloys Corp., 7447 St. Aubin Ave., Detroit 11, is expanding production of sand and permanent mold aluminum alloy castings. New equipment, including a $40,000 core oven, has been added to facilitate the mass production of castings for the automotive industry.

• • •

Conneaut Foundry & Machine Co. has been organized recently and is building a foundry along the Nickel Plate Railroad and Maple Ave., Conneaut, O. The site will contain about 14,000 sq ft of floor space and is of steel and concrete construction. The company will produce light gray iron castings.

• • •

Metal & Thermit Corp., 120 Broadway, New York, will open a new sales office in the Land Title Bldg., Broad & Chestnut Sts., Philadelphia, for handling the sale of arc-welding electrodes. Office will be in charge of C. B. Cooper and his assistant, J. G. Straub.

• • •

Skilsaw Inc., Chicago, has purchased Forss Pneumatic Tool Co., Aurora, Ill., thus supplementing its line of portable electric tools with a line of portable pneumatic tools. F. P. Forss and his son, John, founded the acquired company in 1943. Both will remain with the Skilsaw organization and will be in charge of pneumatic tool manufacturing operations at the Aurora plant.

• • •

Linde Air Products Co., New York, has opened a new oxygen filling station and acetylene producing plant on West Trade St., Charlotte, N. C. The oxygen plant is already in operation, and the acetylene plant is expected to start operating about Dec. 1.

• • •

Foundry of the Regal Production Co., Gays Mills, Wis., has been moved from the fair grounds to an old mill building on the Kickapoo River, Gays Mills. Company makes its own castings for vending machines.

• • •

H. G. Arnold and Ernest L. Fields, formerly connected with the Norfolk Navy Yard, Portsmouth, Va., have leased the Kennedy Pattern & Foundry Co., 15 East "F" St., Anniston, Ala., and will operate it under the name of Arnold Foundry Co.

• • •

Sales of foundry equipment in September represented 424.4 per cent of the 1937-1939 monthly average, according to the Foundry Equipment Manuafacturers Association. This compares with 538.7 in August and 577.2 per cent in Septem-

• • •

Golden Foundry Co., 1616 Tenth St., Columbus, Ind., has completed a new foundry building increasing the capacity of its gray iron casting department. Foundry specializes in engine blocks and parts for marine diesel motors.

• • •

Lovejoy Flexible Coupling Co., Chicago, has acquired in entirety the manufacture and sales of the mechanical power transmission department of Ideal Industries, formerly Ideal Commutator Dresser Co., Sycamore, Ill.

• • •

Verson All-Steel Press Co., Chicago, was reported in the October issue of THE FOUNDRY to have let contract for a foundry building. This report was incorrect, the addition being planned for other manufacturing purposes and not for casting production.

• • •

Building permit has been issued for construction of a $7700 corrugated iron foundry building at 2214 West Fawcett St., El Monte, Calif., for E. D. Tribolet.

• • •

Canton Electric Steel Foundry Specialties Inc., Canton, O., which had been idle for some time has been purchased by a new company, the Clark Castings Corp., and will engage in a jobbing busi-

(*Continued on Page 224*)

FOR *Superior*

PERFORMANCE · ECONOMY · SATISFACTION

VELSICOL
light-color
Coresin Oils

The acceptance and approval of **VELSICOL CORESIN OILS** is based on these distinctive and desirable properties—

CONTINUOUS UNIFORMITY	assured through laboratory control
IMPROVED WORKABILITY	exceptionally clean in core boxes; designed for core blowing machines
FAST BAKING	no over baking or burned edges
DISCIPLINED STRENGTH	greater tensile strength, more rapid collapsibility, clean shake out
CORE ECONOMY	excellent sand-to-oil ratios resulting in high strength cores
ADAPTABILITY	for ferrous and non-ferrous metals

Because **VELSICOL CORESIN OILS** are made in a variety of grades, there is available a coresin oil that will meet the specific requirements of your foundry. Learn how the use of **VELSICOL CORESIN OILS** can improve your casting production and reduce your casting costs. We invite your inquiries concerning samples and concise technical information.

VELSICOL CORPORATION

MANUFACTURERS OF: *CORESIN CORE OILS · AROMATIC SOLVENTS · SYNTHETIC RESINS · INSECT TOXICANTS*

General Offices: 120 Pearson Street, Chicago 11, Illinois

F. F. Pearles Co., R.F.D. No. 1, Detroit, Michigan . . . Midwest Foundry Supply Co., Edwardsville, Ill. . . . Foundry Supply Co., Inc., St. Paul 4, Minnesota . . . H. S. Stoller & Co., Akron, Ohio . . . Manufacturers Equipment & Supply Co., Chattanooga 2, Tenn. . . . Wilson Industries, Cambridge 42, Massachusetts . . . General Foundries Service Corp., Oakland 6, California

HAUSFELD

METAL MELTING **FURNACES**

FOR

BRASS—ALUMINUM—MAGNESIUM

AND ALL OTHER NON-FERROUS METALS AND ALLOYS

GAS OR OIL FUELS

TILTING AND NON-TILTING TYPES

SINGLE AND MULTIPLE BURNERS

AUTOMATIC PROPORTIONING SINGLE VALVE CONTROL ASSURES UNIFORM RESULTS WITH MAXIMUM ECONOMY OF OPERATION.

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

(*Continued from Page 222*)

ness in steel castings. Ernest Lancashire has been made general manager in charge of operations. The chill coil department of the Canton foundry has been acquired by Fanner Mfg. Co., Cleveland. Officers of the company are: W. S. Beckenbach, president; W. S. Clark, vice president; and J. E. Sandford, secretary-treasurer. These officers will not take part in active management of the Canton operation, but will direct operations of Proof Machine & Brass Foundry Co., Clark Cable Corp., and the Bec Corp., all of Cleveland.

• • •

Midwest Alloys Inc., 1200 North Rockhill Rd., St. Louis, has been incorporated with a capital of $26,000. John Sonnenfeld is president of the new company, which will manufacture heat resisting and stainless steel castings. Present site occupies 4200 sq ft of floor space.

• • •

Angelus Die Casting Co. is the firm name under which Robert Hans Sorenson and William C. Armstrong have announced that they are conducting business at 3331 Packers Ave., Los Angeles.

• • •

B & G Iron Works, 1801 Thirteenth Ave., Minneapolis, has received CPA approval to build a plant for the manufacture of soil pipe. Production is expected to start in 1947.

• • •

Permalite Castings Corp., Winchester, Ind., has recently been opened. It is managed by Ed Cos and makes sand and permanent mold aluminum and magnesium castings.

• • •

Hardy Sand Co., Evansville, Ind., is completing construction of a new and enlarged sand milling and preparation plant, of steel construction, at its plant in Tennessee.

• • •

James Pierce plans construction of a foundry building at 396 Washington St., Pasadena, Calif., to cover 1800 sq ft of floor space, at a cost of $5400.

• • •

Standard Pattern & Model Works, Muskegon, Mich., has changed its corporate name to Anderson Pattern Inc.

• • •

Gray iron casting production for September in the Philadelphia Federal Reserve district decreased 8 per cent from that of August but increased 17.4 per cent over that of September, 1945, according to the University of Pennsylvania's Industrial Research Department. Malleable iron production was 5.1 per cent lower than in August but 71 per cent higher than a year ago. Production of steel castings was up 5.7 per cent from August and 1.2 per cent over Sep-

(*Concluded on Page 226*)

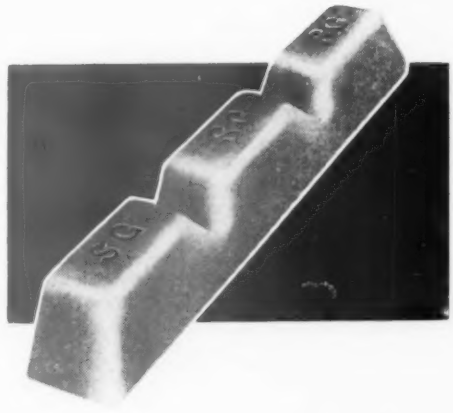
UNIFORMITY

in S-G Aluminum Alloy Ingot

Whatever the prime requirement of your castings may be you can depend on **S-G Aluminum Ingot** meeting it and all of the other requirements of your specifications uniformly, in any quantity.

Constant checking, by the most modern methods, in laboratory and smelter, have placed **S-G Ingot** in an enviable position in meeting demands of modern foundries and diecasters.

Specify **S-G Aluminum Alloys** for trouble free production.



SONKEN-GALAMBA *Corporation*

MEMBER ALUMINUM RESEARCH INSTITUTE

Riverview at 2nd Street · Kansas City 18, Kansas

(*Concluded from Page* 224)

tember, 1945. At iron foundries pig iron supplies were higher than in August, but scrap iron and coke supplies were lower. At steel foundries pig iron, scrap iron and coke supplies were above those of August. Unfilled orders for both groups were higher than at the close of August.

• • •

Clipper Mfg. Co. has consolidated its St. Louis office, in part, with its newly completed factory and general office building at 2800 Warwick Ave., Kansas City 8, Mo., where manufacturing facilities have been expanded and a complete laboratory added for testing cutting results on every masonry material. The St. Louis warehouse, 4030 Manchester Ave., remains as a permanent shipping point. Executive personnel includes: President, Neligh Coates; assistant general manager, Robert G. Evans; sales manager, Art Wiedmann; engineer, Harold J. Wright; export manager, Laurence V. Michaux; assistant advertising manager, Robert M. Stubbs.

• • •

Day's Foundry, Sweetser, Ind., has recently begun production.

"Sa-ay...these are Lighter"

Transite Core Plates offer these advantages:

They speed production
Core makers save trips . . . handle many plates at one time.

They last longer
Made of fibrous asbestos and cement, Transite Core Plates resist shock . . . are less likely to crack or break.

They clean easily
Core wash, sand, etc., do not stick as readily as to other materials. Both sides are usable.

They resist corrosion and warpage
Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are economical
Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time, perforated plates are also available.

JM PRODUCTS

Johns-Manville
Box 290, New York 16, N. Y.

TRANSITE CORE PLATES MADE OF ASBESTOS

Modern Malleable Iron Foundries

(*Continued from Page* 89)

selected and installed, regardless of the type or number of conveyors involved, must do the following two basic things:

1. It must remove the sand from the shakeout and return the sand in good condition to the molder.

2. It must properly clean, cool and temper the sand and handle it through these different operations with a minimum of labor and also a minimum of spillage.

To insure that the above two basic rules are complied with, all systems must incorporate the following operations:

1. Remove all ferrous materials such as shots, spatter, core rods, etc. This is done by the use of a magnetic pulley installed in the shakeout side of the system so as to take advantage of the freer iron. Doing this also protects subsequent equipment from damage.

2. Remove all oversize and nonmagnetic materials such as wood wedges, paper, core lumps, hard baked sand lumps, etc. This is usually done by means of a screen, either vibrating or cylindrical, as a screen is the most economical and efficient unit for this particular work.

3. Remove all fines so that the sand will always have the proper permeability. This is best accomplished by the use of air separation.

4. Cool the sand to a usable temperature. Normally the proper use of air at the transfer points and the screen, and the introduction of water during the tempering operation, will provide the necessary cooling.

5. Condition or temper the sand by means of a suitable mixer or muller.

Caution must be exercised so that any system installed will have ample capacity to take care of any future or peak requirements. Costly experience has shown that most systems are designed and bought too small and when they finally reach the possible peak production limit of the molders, the sand conditioning and handling equipment, also the mold handling, does not have sufficient capacity to take care of this maximum. The extra cost involved in adding reasonable additional capacity is very small, but it can be a source of annoyance and trouble if the equipment is short of capacity in its final analysis. However, care should be exercised as it

(*Continued on Page* 228)

MOLDED TO *Perfection*

VERA-ELLEN
Sensational dancer in Samuel Goldwyn's Technicolor Comedy "The Kid From Brooklyn."

Let Our Practical Foundry Service Men Help You Solve Core Room Problems

Smith Core Oil

WAREHOUSE STOCKS AVAILABLE
In The Following Cities

- Foundry Service Co. Birmingham, Alabama
- E. R. Frost Co. Minneapolis, Minnesota
- Indiana Products Co., Inc. Kokomo, Indiana
- Frank C. Maley Detroit, Michigan
- William F. Rose, Tomkins Tidewater Terminal South Kearny, New Jersey
- Southwest Foundry Supply Co. Houston 7, Texas
- Malcolm G. Stevens Arlington, Mass.
- M. W. Warren Coke Co. St. Louis, Missouri
- Western Foundry Sand Co. Seattle, Washington
- Western Industrial Supply Co. Portland 14, Oregon

These men received a "shirt-sleeve" education on the sandy floors of leading foundries. Their experience was gained the hard way . . . the practical way.

This background gives them the practical know-how and ability so important toward correcting any core room problem that may be troubling you. They won't "steal the show" when they call upon you. Instead, they will work with your men incorporating your suggestions with their own ideas to reach the solution desired. Get in touch with us when core room problems confront you. This service is yours without cost or obligation.

Smith Core Oil

CORE WASH ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

Foundry Statistics

(Reported by Bureau of the Census)

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments — Total	Shipments — Sand	Perm. Mold	Unfilled *Orders
1946				
Jan.	72,265	65,107	1,886	71,827
Feb.	60,856	56,992	1,713	72,736
Mar.	74,971	66,076	2,353	70,622
Apr.	77,919	71,105	2,390	71,108
May	76,054	70,748	2,453	76,792
June	70,910	66,378	1,755	78,449
July	66,695	62,369	2,339	78,018
Aug.	77,733	72,158	2,376	77,538

* For sale only.

Gray Iron Castings

(Net tons)

	Shipments — Total	Shipments — For sale	Unfilled *Orders
1945			
Jan.	861,524	536,499	1,921,572
Feb.	816,467	511,184	1,998,270
Mar.	927,925	587,380	2,089,046
Apr.	842,979	532,015	2,031,668
May	866,951	542,337	2,031,318
June	849,449	543,788	2,015,625
July	748,790	468,017	2,015,005
Aug.	750,050	462,364	1,817,801
Sept.	717,768	434,416	1,754,515
Oct.	767,209	461,720	1,741,981
Nov.	751,092	445,952	1,847,468
Dec.	678,091	397,529	1,877,095
1946			
Jan.	706,319	446,567	2,076,994
Feb.	541,177	368,384	2,152,766
Mar.	796,068	505,431	2,265,336
Apr.	856,678	529,323	2,378,348
May	757,041	454,194	2,491,811
June	735,060	435,866	2,633,118
July	810,829	475,059	2,668,782
Aug.	944,516	558,957	2,785,609

* For sale only.

Aluminum Castings

(Thousands of pounds)

	Shipments — Total	Shipments — Sand	Perm. Mold	Unfilled *Orders
1945				
Jan.	45,588	27,168	10,692	.....
Feb.	44,091	26,674	9,844	.....
Mar.	50,275	29,473	12,355	.....
Apr.	46,320	27,090	11,185	.....
May	43,323	24,398	10,977	.....
June	39,074	21,050	10,254	.....
July	31,130	15,573	8,859	.....
Aug.	22,845	11,384	6,568	.....
Sept.	15,805	7,313	5,325	.....
Oct.	19,825	8,410	7,647	.....
Nov.	18,961	8,137	7,305	.....
Dec.	17,770	7,222	7,248	.....
1946				
Jan.	23,568	9,556	10,131	83,541
Feb.	23,231	11,613	7,866	94,858
Mar.	26,661	10,792	11,305	97,013
Apr.	27,692	11,562	11,010	100,267
May	29,179	11,827	12,220	117,710
June	28,496	11,674	11,767	118,747
July	28,828	10,706	12,213	124,457
Aug.	33,845	12,721	14,309	133,510

* For sale only.

Malleable Iron Castings

(Net tons)

	Shipments — Total	Shipments — For Sale	Unfilled *Orders
1945			
Jan.	78,788	54,111	345,112
Feb.	75,220	51,089	341,558
Mar.	85,307	58,711	349,935
Apr.	76,065	51,011	346,421
May	79,565	52,789	328,471
June	71,992	47,510	285,210
July	55,813	35,439	284,017
Aug.	52,647	33,239	282,136
Sept.	46,960	28,506	219,905
Oct.	59,096	37,307	229,618
Nov.	57,315	36,007	227,309
Dec.	51,963	35,168	236,648
1946			
Jan.	53,685	38,181	245,878
Feb.	40,156	29,338	247,644
Mar.	50,235	33,978	263,227
Apr.	65,010	36,298	275,055
May	62,598	34,975	279,065
June	61,650	35,468	275,845
July	64,446	38,021	271,981
Aug.	67,903	41,345	272,440
Sept.	69,516	39,634	279,509

* For sale only.

Magnesium Castings

(Thousands of pounds)

	Shipments — Total	Shipments — Sand	Perm. Mold*	Unfilled Orders†
1945				
Jan.	10,424	6,149	4,028	....
Feb.	10,366	5,832	4,317	....
Mar.	12,646	6,703	5,677	....
Apr.	11,903	6,257	5,464	....
May	12,134	6,081	5,865	....
June	10,566	4,878	5,473	....
July	9,838	3,961	5,677	....
Aug.	4,960	1,820	3,036	....
Sept.	169	137	13	....
Oct.	251	216	13	....
Nov.	236	208	15	....
Dec.	261	230	14	....
1946				
Jan.	398	349	16	3,114
Feb.	438	366	35	3,338
Mar.	594	525	33	3,484
Apr.	570	465	38	3,297
May	661	587	45	3,778
June	717	623	46	4,063
July	628	477	53	3,986
Aug.	694	568	56	4,234

* Includes incendiary bomb castings.
† For sale only.

Steel Castings

(Net tons)

	Shipments — Total	Shipments — For Sale	Unfilled Orders
1945			
Jan.	210,213	165,116	983,137
Feb.	191,361	152,082	1,045,374
Mar.	222,591	173,506	1,047,660
Apr.	197,737	154,883	1,018,930
May	192,921	149,623	852,877
June	173,685	129,193	776,265
July	139,315	102,428	728,397
Aug.	131,411	98,080	565,559
Sept.	114,613	83,751	513,758
Oct.	130,344	99,495	460,339
Nov.	123,048	91,409	443,773
Dec.	115,239	85,391	434,287
1946			
Jan.	99,058	77,071	*358,926
Feb.	57,423	45,151	390,077
Mar.	101,396	80,843	412,325
Apr.	146,327	108,586	392,790
May	129,211	94,630	381,654
June	123,551	91,715	361,293
July	119,157	84,422	362,581
Aug.	130,450	94,653	374,731
Sept.	126,415	90,675	383,951

* For sale only. Unfilled orders for 1945 include tonnage for sale and own use.

(*Continued from page* 226)

is just as easy to overequip a foundry as it is to underequip it, and if the equipment investment is too large to show a reasonable profit it is almost as bad as not having any equipment at all.

Up to this time everything that has been said has been based on the assumption that the melting cycle can be reduced by the use of duplexing, which is the most economical melting method, considering all factors. However, there may be some plants which cannot go to duplexing or do not wish to do so for various reasons. This presents an entirely different problem.

If batch pouring and batch melting are used, it means that the entire mold handling arrangement has to be designed accordingly. Normally, to meet a condition of this type it is necessary to provide enough space so that a bank of molds can be set up to take the entire melt. This usually resolves itself into providing enough space to allow for approximately three hours molding, which is assumed to be the normal melting cycle, or time between batches. This, of course, could be cut down by the use of more air furnaces and the space allotted to the molds reduced accordingly.

When this is done a lot of the efficiency gained by the introduction of mechanical equipment is lost because all available labor has to be used for a short period of time to pour off the heat. Other disadvantages, beyond the need of a larger floor space, are an increased inventory of flasks, more pouring weights, additional sand storage capacity required due to setting up of this bank of molds, and the need of larger or longer pouring cranes and monorails to cover the entire area. The entire sand handling equipment also has to be rearranged and expanded to cover this additional area, meaning a larger initial expense.

The basic units of the sand handling and sand tempering would be approximately the same as under the continuous pouring system. While this method may not be as economical as continuous pouring, it does have some definite advantages over the old method of shoveling the sand and running the molds out on the floor. For one thing, sand handling regardless of the type of mold handling, will clean up the foundry and will remove a big percentage of the hard manual labor required by eliminating the handling and shoveling of the sand off the floor. It also insures that the molders

(*Continued on page* 230)

The PATTERN SHOP

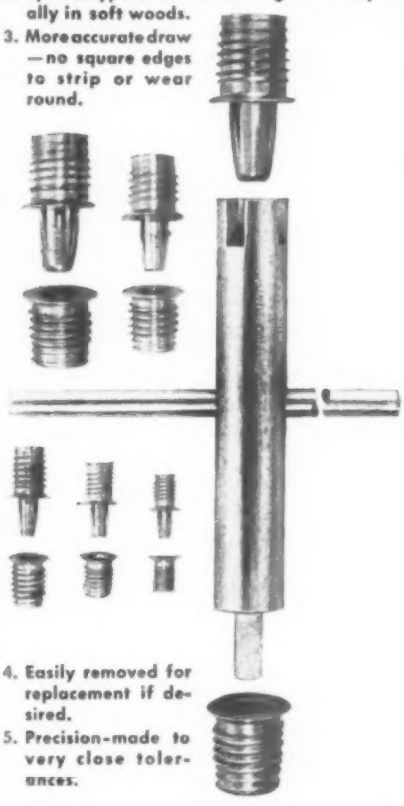
NEW IDEAS

Here are some more new Kindt-Collins innovations for the advancement of pattern shop and foundry practices. These developments typify the Kindt-Collins policy of devoting engineering skill and money to perfect new ideas, new methods and new products for the betterment of the entire industry. Year after year better, more efficient supplies and equipment come from Kindt-Collins . . . year after year the number of satisfied Kindt-Collins customers grows bigger and bigger.

New and Improved MASTER Brass Dowels

New holding power . . . new ease of use . . . these are the improvements offered you in the new Master Brass Dowel line for *wood patterns and core boxes.* Here are the special features:

1. **New broached head design of male part and new method of insertion eliminate twisting off in hard wood.**
2. **Special type threads assure tight hold especially in soft woods.**
3. **More accurate draw—no square edges to strip or wear round.**



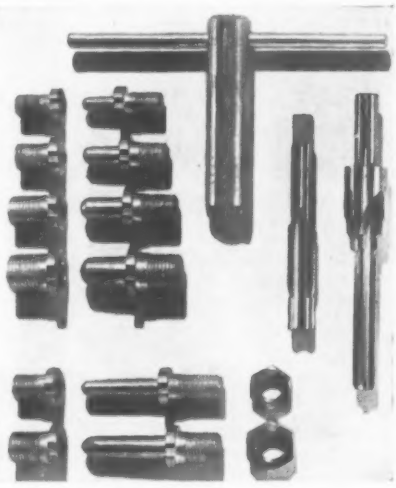
4. **Easily removed for replacement if desired.**
5. **Precision-made to very close tolerances.**

Master Brass Dowels in the new design are available only in sizes from 1 to 5, with special wrenches to fit each size. Sizes 0, 6 and 7 are available as previously. Standard Packages: Nos. 0, 1, 2 and 3 dowels packed 100 in box. Nos. 4, 5 and 6 packed 50 in box. No. 7 packed 20 in box.

Send us your order for the new Master Brass Dowels today, and let them prove their advantages to you right in your own shop.

MASTER Sure-Lock Dowels

This is the first real advancement in *metal pattern and core box* dowels in years. The new MASTER SURE-LOCK Dowels now make possible new economy and efficiency in foundry work! Note these important SURE-LOCK Dowel advancements:



1. **Inserted more easily, quickly, accurately.**
2. **New type shoulder and taper fit of body keep dowel anchored tight.**
3. **Replacements and consequent loss of time drastically reduced.**
4. **Longer, more accurate draw. Head of male part entirely round.**
5. **New type wrench of hardened steel permits firm tightening of dowels. No stripping of dowel.**
6. **Dowels accurately machined from steel, hardened and cadmium-plated to prevent rust.**
7. **Sizes available: Nos. 1, 2, 3 and 4 Standard; Nos. 1, 2, 3 and 4 Special with extra long pin and body on male part. These long-bodied pins can be fitted with nuts for permanent installation. Nos. 1, 2, 3 and 4 Special can be inserted with same tools as used for standard Master Sure-Lock.**
8. **Only four tools required: Drill, Master Sure-Lock Combination Counterbore and Reamer, Master Sure-Lock Tap, and Master Sure-Lock Wrench.**

Write for complete descriptive literature and prices.

New MASTER Cast and Ground Aluminum Tuff-Plate

Again Kindt-Collins offers an innovation in the foundry field . . . the first big improvement in pattern plates in 20 years . . . the new MASTER Cast and Ground Aluminum Flat Plate with cast-in tough steel inserts!

Features include:

1. **Tough knurled steel inserts cast integrally into the plate—reduce wear by flask to a minimum—greatly increase plate life.**
2. **Steel inserts are so placed as to effectively distribute and equalize wear at flask contact points.**
3. **Surface specially ground to prevent sand slippage.**
4. **Ground surfaces accurately parallel to plus or minus .003" tolerance.**
5. **One-inch allowance all around for flask strip.**
6. **Three-inch ears standard—to accommodate all types of flask-pin guides. Edges rounded for easy handling.**

Mount your patterns on MASTER Tuff-Plates for high production without plate replacement and delays. MASTER Tuff-Plates will deliver longer life and economy in patterns, and assure increased accuracy in your castings. Write for chart of sizes and prices.

MASTER Recessed Aluminum Plate

This is a specialized cast and ground aluminum plate that is ground flat on one side . . . and has a recessed area 1/32" deep on the other side, permitting the sand in flask to meet and make a perfect joint, thereby largely eliminating finning. In addition it has all the other special features of the MASTER Tuff-Plate described above. Write for prices and complete information.

MASTER Pat-Kote

Wartime research and experience now have made possible a pattern coating even better than our prewar MASTER Pat-Kote . . . for many years recognized as the most outstanding product of its kind on the market!

Pat-Kote will not stick in the sand, is waterproof and oil-proof, and eliminates sanding between coats. It is self-leveling, has high wear-resistance, dries over oil and wax, and does not raise grain.

MASTER Pat-Kote is available in Clear, Clear Orange, Vermilion, Chrome Yellow, Black and Aluminum, in one gallon cans. Other colors available on quotation.

THE KINDT-COLLINS CO.

Everything for the Pattern Shop

12651 ELMWOOD AVE. • CLEVELAND 11, OHIO

(*Continued from page* 228)

will be supplied with uniform sand properly tempered.

All foundries are usually required to do a lot of preliminary experimental work before scheduling a pattern on a production run and this fact is normally overlooked when mechanizing. As a result the proper operation of the complete system is penalized from a production angle due to the disruption of work caused by this experimenting in the regular line. Separate floors divorced from the regular production lines should be provided to conduct this work.

The use of sand handling and mold handing equipment will insure lower costs and better appearing castings, and the advisability of installing this type of equipment in the past has been governed entirely by the definite advantages of cost reduction. However, the foundry industry is approaching an era where it must analyze the use of equipment of this type on the basis of making the foundry a more attractive place to work so as to insure a good supply of high grade workers at all times. This may be considered a highly debatable point as the savings and results would be intangible, but the proven tangible advantages which will result from the installation of sand handling equipment, are as follows:

1. It will increase the molders' output by eliminating the shoveling and thereby lower labor costs accordingly.

2. It will eliminate the necessity for a night shakeout gang which, at best, is inefficient and a costly operation.

3. It will give a smoother surface to the castings, due to the fact all the sand will be conditioned equally and can be made to peel readily, thereby lowering cleaning costs.

4. It will also result in less scrap due to sand. Control of the temper and strength of the sand will be under one man and can be checked readily.

5. It will eliminate the necessity of making special facing sand, which, in itself, is a costly operation due to the amount of labor necessary to make and distribute this sand to the different molders. Also, an extra operation of the molders—putting this facing in the mold—will be eliminated.

6. Molders, by not having to carry out their molds, become more efficient since they are molding continuously and are relieved of the fatiguing carry-out labor.

7. Pouring is confined to suitable points, properly ventilated, where it can be done most efficiently. This also applies to shakeout stations. This is a very important point as proper ventilation in a foundry is becoming more and more the "must" under state codes and all foundries will have to provide some method of removing dust, gases, etc., from the foundry, regardless of whether they are mechanized or not.

Other Benefits Are Realized

A number of other benefits can be derived from a foundry sand handling and mold handling equipment that cannot always be figured in dollars and cents but are very important in the overall operation of a company. The following list covers the ones which are readily apparent:

The increased production obtained from a given amount of floor space will eliminate the necessity of investment in additional buildings.

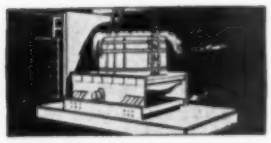
Continuous pouring will reduce the number of men required. By specializing, workers become more proficient and are able to do considerably more than men who pour only occasionally.

Sand consumption will be less, due to eliminating the gangway losses, the better peeling effect of properly tempered sand and reclamation of old core sand.

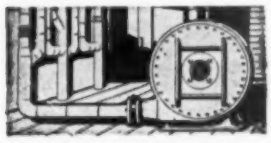
There will be some slight saving in core deliveries through the more central location of core racks, resulting in better

(*Concluded on page* 232)

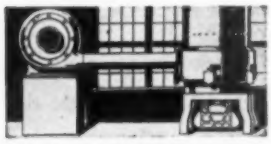
WHY DUST CAN'T CHOKE THIS FAN



Sturtevant Foundry Shake-out Systems—completely control dust and fumes, increase worker efficiency and equipment life, cut down maintenance.



Sturtevant Compressors—hold air pressure constant, in supplying blast to oil or gas burners. Lifetime efficiency, minimum maintenance; worthwhile power savings.



Sturtevant Cupola Blowers—assure smooth, constant pressure supply of air. Compact, simple, sturdy construction; sizes and types for all conditions.

Sturtevant Dust Control—pioneer experience in engineered systems for collecting dust from snagging, tumbling and sandblasting operations.

Sturtevant Fume Control—efficient tailor-made systems for production foundries or low-operating-cost equipment for jobbing shops.

STURTEVANT PLANOVANES HANDLE DIRTY OVEN GASES EFFICIENTLY

Open wheel design and large passages through the housing enable the Sturtevant Planovane Fan to handle dirty, dust-laden gases efficiently up to 900°F. That means steady, dependable circulation of air in core ovens, mold drying, or heat treating. Slower operating speeds reduce power costs, help to cut friction and eddy losses, keep the fan at top, maintenance-free efficiency.

Fan shaft bearings are cooled by means of a special "heat slinger," a small extra fan on the main shaft which draws off excess heat, prevents breakdowns, cools more surely than water without the expense of water-cooling equipment.

Special wheels available for handling explosive gases or corrosive materials. Call the nearest Sturtevant branch office, or write: B. F. STURTEVANT COMPANY, *Division of Westinghouse Electric*, Hyde Park, Boston 36, Mass.

STURTEVANT PRODUCTS
DESIGNED TO MEET YOUR FOUNDRY NEEDS

Sturtevant
Puts Air to Work

B. F. STURTEVANT COMPANY • DIVISION OF
Westinghouse ELECTRIC

NOW AVAILABLE TO EVERY FOUNDRY

MINCO BOND

LET'S TAKE THE HOLES OUT OF CASTINGS

Let us again pause in our sales of MINCO BOND to analyze and correct the causes of holes in castings.

Practically only three conditions cause holes in castings. First among them is low permeability in the molding sand. This condition is readily recognized by pin holes showing in the casting surface, the cope surface of the casting usually the worse. The procedure to correct this is obvious, *increase the permeability of the molding sand.*

The second condition is in the metal. Foundry men cover this whole subject with two words "WILD METAL". When metal conditions are correct all the gases are generated in the first few seconds after the metal is poured into the mold. The metal then lies quiet, and liquid, until it solidifies and the result,—a sound casting. When the metal is "wild", it seethes and agitates and makes gas continuously until the very instant it solidifies, when the gases not yet out of the metal, are trapped within it, and these are the holes you find when the casting is later examined. These holes are usually general throughout the casting. Some run parallel with the casting surface, some run oblique and others diagonal. Altogether it makes for a very unsatisfactory casting. In some castings, due to their shape, together with the engineering of the pattern, a large single hole is found in the casting. Usually each casting has this hole in about the same place. Foundry men call this hole a "shrink"; sometimes it is called a "blow". To get relief from this trouble *the metal* must be corrected. The metallurgist has struggled thru the years to correct these disturbances in the metal and many excellent relieving agents have been developed, which, when added to the molten metal brings relief in a great many instances. A certain type of riser also gives relief in a great many instances, but other than this nothing has ever been done since the beginning of foundry practice to release the enormous quantity of gases in the molten metal *"before" it is poured into the mold cavity.*

The third and greatest cause of all the losses due to "gas holes" and "shrinks" is in the construction of the ladle. The type and construction of the foundry ladle today is practically identical to the ladle used at the time of Abraham. The ladle, then, as now, was constructed to contain, transport and pour molten metal only. Nothing has ever been done to construct a ladle from which the gases could escape, other than thru the open end or top. Instead of constructing the shell of the ladle, large or small, as they always have, out of heavy, tight steel, the shell should be constructed of 1/4" or 5/16" wire with 1/4" openings between the wire. For the larger or bull ladles, a larger dimensional wire should be used, based upon the load it is expected to carry. When these open, heavy wire ladle shells are lined with the customary fire clay and sand mixture, an effort should be made to use materials which will give all the permeability possible to attain. Instead of the customary ladle lining mixture of one part fire clay to one part sand, a mixture of one part fire clay to two parts sand, would allow better elimination of gases. Fire brick used in lining the large ladles should be purchased on standards of PERMEABILITY as well as the qualities now demanded.

However, until some manufacturer takes up the production of a porous ladle shell as outlined above, it is necessary to use the methods given below to get what relief you can.

1. Have metal hot enough and hold in ladle, "no cover over ladle", a short time before pouring. This allows gases to escape thru top opening of the ladle and lessens the amount of gases the molding sand will have to handle.
2. Make all gating the *shortest* all "possible". Make gates of ample diameter to allow metal to enter mold cavity *quickly* and without *force or jet action.* Have gates connected to *heaviest* section of casting.
3. Have gate connected to riser as explained on Page 14 of our booklet entitled "Shrink Holes in Castings".

We might add that the use of MINCO BOND MAINTAINS AND SLOWLY INCREASES THE PERMEABILITY OF YOUR MOLDING SAND.

Below are the outstanding PHYSICAL QUALITIES of MINCO BOND. In no other mineral bond in the foundry world can you purchase so much intrinsic value for your dollar.

1. **HIGHEST FLOWABILITY** (sand flows freely thru chutes and hoppers without clogging and sticking at all green strength ranges, high or low. Minimum ramming produces uniform mold hardness.)
2. **GOOD GREEN STRENGTH** (at all workable moisture ranges).
3. **HIGHEST COLLAPSIBILITY** (which increases flow of castings thru shake out and cleaning equipment. Reduces shake out and cleaning costs.)
4. **HIGHEST DRY STRENGTH** (No other bond in the foundry world will give you high dry strength combined with high collapsibility. MINCO BOND does.)
5. **MEDIUM HOT STRENGTH** at pouring temperatures. (Eliminates cracked castings.)
6. **HIGH DURABILITY** (which still further reduces costs).
7. **NO EXPANSION AND NO CONTRACTION** at room temperatures.
8. **THE USE OF MINCO BOND SLOWLY INCREASES PERMEABILITY** and
9. **INHIBITS THERMITE REACTION** which eliminates casting blows.
10. **REDUCES SCRAP LOSS DUE TO SAND FAILURE.**
11. **MAKES SMOOTHER CASTINGS.**
12. **A NEUTRAL MINERAL,** having a pH of 7.5 (will not foul up heaps or systems when in long, continuous use.
13. **MINCO BOND IMPARTS ALL ITS FAVORABLE QUALITIES TO ANY OTHER BOND WITH WHICH IT IS USED** and
14. Because of this ability *its use increases the production of castings at least 10%.*

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SAGINAW, MICHIGAN

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FOUNDRY SUPPLIES CO. 461 W. 33rd St., Chicago, Ill.
THE HOFFMAN FOUNDRY SUPPLY CO. 1193 Main, Cleveland, Ohio
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WM. R. BARNES COMPANY, Ltd., 243 Cumberland Ave., Hamilton, Ont.
MOLDEN Ltd., 301 Murray St., Montreal, Quebec
SHANAHAN'S LIMITED, Vancouver, British Columbia
SHANAHAN'S LIMITED, Winnipeg, Manitoba
INDUSTRIAL FOUNDRY SUPPLY CO., Inc., San Francisco, Calif.
INTERSTATE SUPPLY & EQUIPMENT CO. 647 W. Virginia St., Milwaukee, Wisconsin
INDEPENDENT FOUNDRY SUPPLY CO. 2325 East 38th St., Los Angeles, Calif.
CONET PRODUCTS CORPORATION 400 Madison Ave., New York, N. Y.
Eastern Representative: GEORGE H. MALE, 50 West 44th St., New York City
Foreign Export Representative

(*Concluded from page 230*)

service to the molders and perhaps less supervision of core deliveries; also less loss in broken cores due to uncontrollable delivery conditions.

Work in the production department is simplified somewhat because the jobs are run off quicker and can be kept track of easier and there is less difficulty in putting through rush orders.

Handling of the castings is also an important item. In a nonmechanized foundry it is common practice to let all castings lay until the evening and then bring them over to the cleaning room and dump them into a large heap. However, if a mechanical foundry is arranged properly, the castings will come in a more or less continuous, even flow and the cleaning room can be arranged so that work flows through uniformly rather than having high points of peak production with the necessary lulls in between. Uniform delivery of castings results in better working conditions for the cleaners, sorters and inspectors.

It also helps conditions around the pot packing stations. In connection with the packing problem, recent developments have improved the methods formerly in use. It is no longer necessary for the packers to work in dusty hazardous surroundings.

A well engineered annealing room provides for storing the packing material in overhead bins so that the material can be fed to the stacks by gravity, eliminating all hand shoveling. It also insures a uniform size material, since during the process of handling it into the bins it can be screened where all the oversize and dust can be removed.

Dumping the stacks after annealing should be done mechanically during which operation the castings and packing materials are separated. The castings are fed into containers which can be transported to the subsequent operations by gravity roll, conveyors, lift trucks or monorails. In any case, the castings should be kept in containers so as to minimize the manual handling required between operations.

Mechanization of the dumping and packing of pots for annealing show tangible results in labor saving and elimination of dust conditions. Other points also should be taken into consideration, such as proper alignment and sequence of operations and the keeping of material at the proper working height; these produce savings of an intangible nature.

In brief, when the proper engineering study is applied to most malleable foundries it will show gratifying results in both cost reduction and increased production.

The New AJAX 125kw. Furnace for the Aluminum Alloy Foundry

• Especially designed for the melting of finely divided aluminum alloy particles like turnings, chips and unbaled foil, this furnace is operated on the twin coil induction principle. Oxidation losses are reduced considerably, and yields of 95% to 96% of the dry weight of the charge are obtained with this unit, in view of the rapid melting and the low temperature prevailing in the hearth during the melting operation. These units promise large savings in the recovery of aluminum alloy scrap of all kinds, in addition to all the other advantages of induction melting.

Ajax Engineering Corporation
Trenton 7, New Jersey

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, AJAX ELECTROTHERMIC CORP., AJAX ELECTRIC CO., INC., AJAX ELECTRIC FURNACE CORP.

Materials Handlers Plan Exposition

The first exposition to deal entirely with industry's material handling problems, a phase of industry said to represent approximately one quarter of all costs, will be held at Public Auditorium, Cleveland, Jan. 14-17. Earl I. Burke, Republic Steel Co. and chairman of the packaging and loading committee, American Iron & Steel Institute, is policy committee chairman of this first National Materials Handling Exposition.

A four-day program of prepared papers and discussions by material handling specialists from many industries, will be held concurrently with the exposition. The foundry industry's material handling problems will receive special attention in a separate program of prepared papers and panel discussions. Outstanding experts from the foundry industry will lead the discussions.

Edwin J. Heimer, president, Barrett-Cravens Co., Chicago, is chairman of the exposition committee, and Ezra W. Clark, vice-president and general manager, Clark Tructractor division, Clark Equipment Co., Battle Creek, Mich., is program committee chairman.

Cupola Melts Above Capacity

(*Continued from page* 101)

and squeeze machines. Molds never are touched, tooled or finished by hand. Unless they are perfect leaving the machine they are shaken out.

Close control is exercised over the preparation of the various sand mixtures for molds and cores. Walls on many castings are only 3/16-in. in thickness. Nice adjustment of the sand in bond, permeability and moisture content is essential to the production of castings free from cuts, scabs, buckles, porosity, shrinkage, cold shuts and other forms of defects in the long list with which foundrymen are familiar.

No Artificial Venting Used

Patterns and mold for a typical casting of this character are shown in Figs. 5 and 7, the patterns mounted on a machine in Fig. 7, and the combined drag and core, in Fig. 5. Two castings are molded in a flask 14 x 22 in. with a 4-in. drag and a 12-in. cope. Metal from a single sprue enters a long runner extending almost the entire length of the joint at one side, and with a branch extending in the center between the two mold cavities. A number of thin, flat gates convey the metal from the runner into the molds. As if to add one more hazard, each casting has a central diaphragm extending from the top to the bottom. Under ordinary conditions, the average molder would claim that a prodigal use of the vent wire would be necessary to prevent the metal from *kicking* off the green sand core. No artificial venting of any kind is employed in the making of these molds.

Before ramming the drag a few handfuls of strong, new sand are thrown into the patterns. This is a heavily bonded bank sand, permeability 220, moisture content 3 per cent. The remaining space in the mold is filled with sand from the heap. The mold then is jolted, squeezed, butted and rolled over and placed on the floor as shown in Fig. 5. Extra long detachable guide pins insure an even closing of the cope over the drag. In addition to getting along without any vents, the upright green sand cores stand up without rods, soldiers or any other form of artificial aid. A somewhat similar casting, not quite as deep and without the central diaphragm, a drinking basin for cows in a dairy, is made to the extent of several thousand each year.

The coremaking department of the foundry occupies space approximately 14,000 sq. ft. at the south end of the foundry, and is equipped with benches, core blowing and other machines and an extensive battery of rack type ovens. An empty rack is placed near each coremaker's station. When the shelves are filled with cores, a lift truck picks up the rack and places it in one of the ovens. The process, of course, is reversed when the rack load of cores is dried. Oil-bonded sand in various combinations is employed for making the cores. A high degree of permeability is maintained in mixtures and as a result the majority of the cores do not require any artificial venting.

An exception to the general rule is typified in the corebox for making a thin disk core shown in Fig. 6. Because a thin copper plate insert has to be placed in the center, each half of the core is blown separately through the blowplate shown in the center. A raised semicircular ridge of the blowplate forms a channel in the joint face of the core. After the copper plate is adjusted in place the core is *booked*, that is the two half boxes are joined and raised to a

Ajax ALUMINUM BRONZE ALLOYS

for WEAR-RESISTANCE

STABILITY AT HIGH TEMPERATURES

ABILITY TO WITHSTAND SUDDEN STRAINS

Investigation of Aluminum Bronze Alloys is warranted by foundrymen and designers where metal parts are subjected to either recurrent stresses or compressive forces and resistance to fatigue is sought; where the ability to withstand high temperatures or, where a high degree of corrosion resistance to many chemicals may be a significant factor in material selection. Supplied by Ajax in alloyed compositions of copper, aluminum and iron, as well as special alloys containing nickel and manganese, a complete selection of Aluminum Bronzes is available to meet all existing specifications as listed by Non-Ferrous Ingot Metals Institute, ASTM and the Federal Government.

Ajax, in adhering to its policy pioneered in the very infancy of the non-ferrous metal industry, exercises the closest scientific control over the production of these alloys. Metal men may look to Ajax with continued confidence not only for supply of highest quality Aluminum Alloy ingots, but also for practical technical know-how on correct foundry practice for producing better castings with fewer rejects. Request booklet "Ingot Metals of Today".

Standard Ajax Metals

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
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Ajax Nickel Alloys
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ASSOCIATE COMPANIES

AJAX ELECTRIC CO. ● AJAX ELECTROTHERMIC CORP. ● AJAX ELECTRIC FURNACE CO. ● AJAX ENGINEERING CO.

vertical position. A small touch of paste on the joint insures close contact of the two sand faces. The assembly then is lowered back to a horizontal position. The drag half of the corebox is removed, leaving the core supported on the drier.

Metal coreboxes are machined to size and shape with watchmaking accuracy. Drier shells, with the inside cavity corresponding to the shape of the drag half of the core, support the core and prevent sagging or distortion while the core is in the green state, before and shortly after going into the oven. Each drier shell is pierced with many small holes to prevent the core from sticking through moisture driven from the core during the baking period. A single corebox may serve a coremaker throughout the day, but he needs a great number of the driers, one for each core. Naturally the number varies according to the number of cores made in the period between the time the cores go into the oven and the time they come out, when the shells are available to be used over again. Literally, thousands of these driers are stored in a room adjoining the coremaking department.

Close control is maintained over sand and iron in a well equipped laboratory adjacent to the shop office in the north end of the main building. Sand samples are tested continuously for permeability, moisture content, bond and green strength. Iron test bars, poured periodically, furnish information on the composition of the metal and on the physical and chemical properties. Many of the castings, especially those in the high strength classification, must meet close and exacting specifications physical and chemical. Superior properties in many instances are secured through the use of chromium, vanadium and other alloys added to the metal in the ladle.

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CORE BOXES LAST LONGER WITH WEDRON round grain sands

We have specialized for years in processing washed and dried white silica sand for all foundry purposes . . . especially in the finer meshes for use in core blowing.

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Ideal for the production of high quality light metal castings.

We also produce washed, dried and screened white silica sand in the coarser grain sizes for all foundry purposes, including coarse blasting sand and are the largest producers of SILICA FLOUR in the Central West.

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Mines and Mills in the Ottawa-Wedron district

38 So. Dearborn St. Chicago (3), Ill.

PATTERN RIGGING IN PRODUCTION MOLDING

(*Continued from page* 111)

Of course, there are many other devices and equipment that must be co-ordinated in order to make these figures possible, but one thing is certain and that is that good pattern equipment and proper application of this equipment to the job to be done is very essential.

The Ford foundry has an installation in operation which has been unique in molding steel alloy pistons by the green sand method. This layout was also built around sandslingers, except that the slingers were automatic and the molding machines actually designed and installed tight to each other. There are three parts to the flask so three turntable sets were necessary—one for the cope, one for a cheek mold and one for the drag. No chuck bars or gaggers were used as we actually rammed the wrist pin bosses automatically with a drill running backwards, the drill head itself being timed mechanically to the molds and as one mold is finished, the whole drill head returned for the succeeding one. No sand was removed, only a packing action taking place so that soft molds were a thing never heard of again after its installation. Molds from this operation were made at the rate of, 400 drags, 400 copes and 800 cheeks per hour, so it can be readily seen that pattern and molding machine applications really become highly mechanized at times.

Another large field in which the pattern problem is of major concern is the matter of patterns required for dry sand molding and also those required for dry sand cores.

As an example, consider the molding of crankshafts by the dry sand process. This operation at Ford is another high production layout and, due to the quantities involved and the floor space avail-

able, it was set up for slinger operation. The pattern boxes are mounted on special roll-over and draw machines. The operation attains a speed of 530 molds per hour per turntable (three in all) since 16 cores are required per mold. Four crankshafts are made in each mold so it requires 1500 molds per 16 hours which calls for a total of 25,500 individual cores to be made in 16 hours, for a total weight of 795,000 lb.

We have many other types of coremaking, starting with bench type boxes to the blow machine job, both manually operated and also automatic. Ordinarily a majority of our cores are made by blow machines. The core boxes are handled from man to man on roller conveyors before and after the blowing operation, as is usual in most plants. However, when the boxes are complicated and require a great deal of handling, or when they are too large or too heavy to be handled continually, we use slinger operation or, as in one case which will be described later, we have installed automatic blowing.

Use Air for Power

Blow machines, in general, are simplified ramming units, using air as the medium of power application instead of hand ramming, jolting or sand slinging. In the case of our automatic unit, where we blow 350 V-8 cylinder water jackets per hour, that becomes a distinct type of mechanism in itself, probably giving the highest economy of any type of machine molding in existence anywhere.

This installation involved a considerable amount of engineering. A very important decision had to be made as to how to apply an automatic blow head to a continually rotating turntable. The core box used had two sides which part in a pull-back operation, also four loose pieces and two vent rods. The withdrawals are done by the different operators stationed around the table and, of course, the last operation is removal of the core on the core plate and placing it in the core oven.

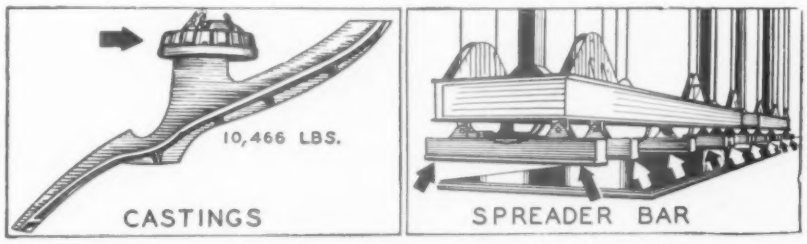
The operation of making cylinder jacket cores is certainly a machine-molding problem and necessitates the use of much expensive equipment, more by far than the ordinary method of individual blow machines with gravity rollers for conveying the blow head. To work out the sequence of operation, it was decided to index the blow head and make the turntable rotate continuously.

A 60-cam operational robot fastened to a mast in the center of the turntable actuates air valves and these in turn actuate air cylinders required to do the necessary operations of bringing the blow head to position, blowing the core and returning the head to the following box. At the blow station, pressure is applied by air and this is absorbed below on heavy rollers and above on a structural steel framework.

These machines, including the turntables, boxes and all mechanism must be in first-class working order at all times and the turntables must run true or plenty of trouble can be expected. This, frankly, can be stated as a mass production hazard if not properly maintained, but experience has shown that mechanization of this robot type can be made to pay where schedules are high and much handling of core box equipment can be eliminated.

We still feel that new fields of design can and will be searched out in our all-out endeavor to cut production costs. For example, one turntable on our engine deep jacket core produces with this type rigging and only one blowhead a total of 350 6 x 10 x 22 in. cores per hour weighing about 14 lb each with a minimum amount of handling.

We have other cores in which the boxes have been rigged to turntable operation, but in which the sand has been slung into the box. These are the bar-



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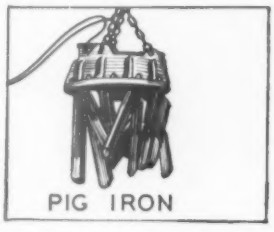
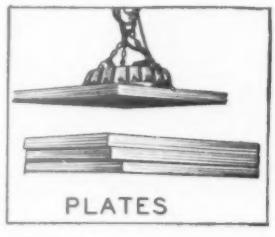


You get definite saving of time and labor in moving material inside and outside of your plant with Stearns Lifting Magnets.

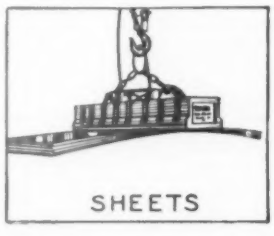
Will speed your loading and unloading operations—obviate hand labor on dangerous and difficult jobs—increase storage capacities—reduce your costs.

Let Stearns give you a lift with sturdy, dependable, low initial and operating cost magnets. Can be had in all practical sizes and shapes to suit your requirements.



Stearns Magnets are being successfully and profitably used in handling scrap iron, loose or baled; steel plates, coils, bundles, strips, rails, slabs, billets, pig iron, castings, borings, turnings, finished products, etc., as well as for road and floor sweeping purposes. Can be installed on industrial crane trucks for out of the way spots not reached by overhead cranes.

Stearns Magnets pay for themselves in a short time, required surprising little attention, are your best bet for economical, fast and safe moving of material.



And—we can furnish Suspended Separation Magnets also in sizes and shapes to do your work.

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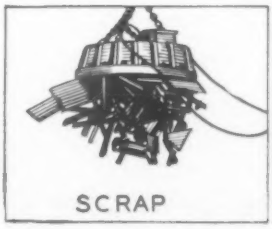
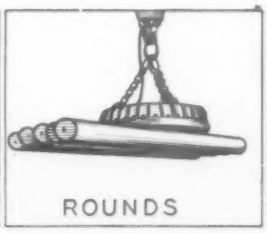
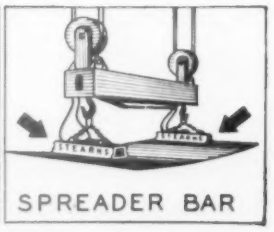






rel core—12,000 in 16 hr, crankcase core—85 lb, 6000 in 16 hr and the valve chamber core—35 lb, 6000 in 16 hr. The barrel core is particularly interesting on account of its high production and also since it is necessary to ram up an arbor in a specially built core box. Two turntables are fitted with 12 each especially built roll-over and automatic draw machines. These operations certainly prove that an enormous amount of production can be obtained in a very limited space. One of the main differences between slinger and blow-machine operation is the sand spillage, but this spillage falls through grating in the table and is returned at once for further use.

Conclusions — Certain conclusions to be made from the foregoing analysis of the subject of pattern rigging can be summed up as follows:

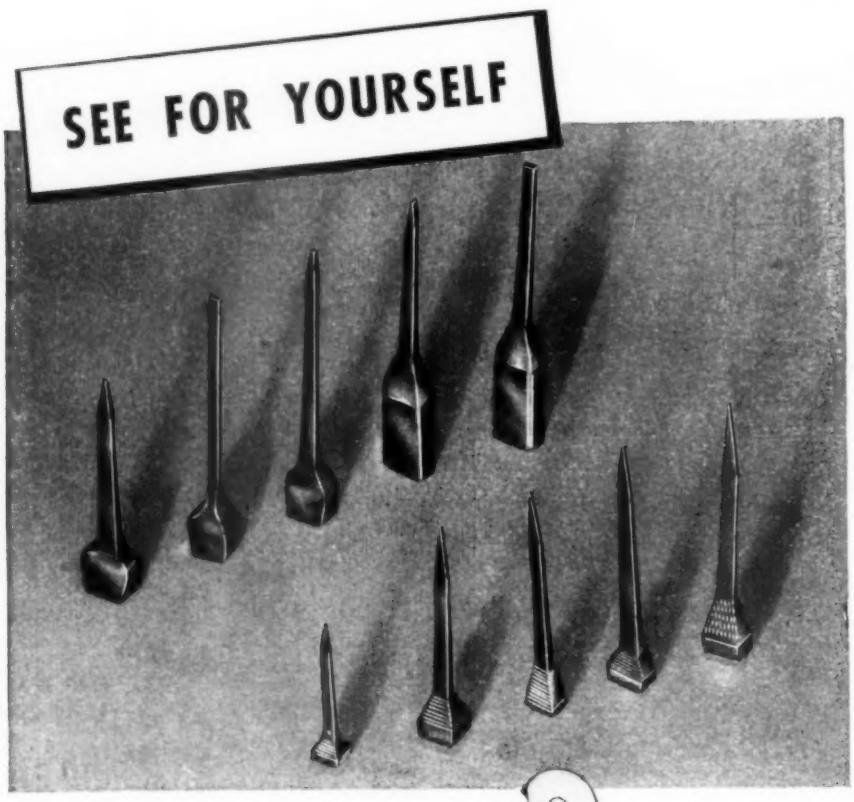
1. The patterns and machine to which they are attached are, as it were, a team, and should be considered so from the inception of the idea of casting the piece required.

2. The pattern and the corebox are to be considered at the same time. We are usually prone to consider the boxes as a secondary affair and too often core costs need attention much more than the cost of molds. We are sure of this at our plant.

3. Maintenance is a large factor in establishing the type of rigging to be used. With present day costs for mechanics, much attention should be given to the choice of the mountings used for patterns and core boxes. In other words, the foundry of today, especially the high production ones, must realize that we have now left the old-fashioned methods behind and arrived at something of a real mechanical era in the foundry business.

Therefore, we again wish to stress the fact that whether it be a problem of pattern rigging, or any other division of foundry practice, it surely becomes more and more necessary that engineers believe enthusiastically in the fact that mechanization is here to stay and as wages and inefficiency go up and as effort goes down, we as foundry managers or technicians must spend a great deal more time trying to solve the problems of costs arising daily in our industry.

Editor's Note: This discussion of modern trends in pattern rigging for production molding is from a talk given by the author before the regional foundry conference held at Michigan State College, April 5-6.



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See how Capewell's improved heat treating results in faster cutting and longer lasting blades. Take advantage of these savings in time and costs. Order from your mill supply man.

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University Publishes Bulletin on Clays

The University of Illinois, Urbana, Ill., has published a bulletin "Clays In Dry Molding Sands," which is the second part of a report entitled "The Bonding Action of Clays." This report is the outcome of an investigation made by the Illinois State Geological Survey Division of the Department of Registration and Education and the Engineering Experiment Station of the University of Illinois under the sponsorship of the Illinois Clay Products Co., Joliet, Ill. Objective of the work is to provide information on the properties of molding sand and bonding clays. Data are presented showing the relation of dry compression strength to the amount of tempering water for varying amounts of each type of clay. A theory of dry strength is presented based on the wedge-block concept of holding grains in place.

Part of the report, "Clays In Green Molding Sands," presents results of a fundamental study of the bonding action of water and clays in green sands and a discussion of the modern and generally accepted concept of the structure of clays.

Lawrence Foundry Co., Grove City, Pa., has changed its name to Johnstone Foundries Inc. George Johnstone is president and general manager.

NATIONAL FOUNDERS CONVENE IN FIRST POSTWAR SESSION

(*Continued from page* 97)

Cecil B. Dickson, chief, Washington Bureau, Gannett News Service, Washington, declared there is considerable talk of compulsory arbitration coming up for action in the next Congress. He warned management, however, to consider carefully any such support as they may give to such legislation, pointing out that once compulsory arbitration is written into law, it will apply to employers as well as to employees. "With the power many labor leaders now have," he said "some of them think they will win more advantages from employers for union members if compulsory arbitration becomes the law of the land."

He looks for the new Congress to abolish government interference with results of collective bargaining; to enforce labor contracts on both sides; to insist upon a compulsory cooling off period in labor disputes; to prohibit secondary boycotts; and to establish fact finding boards in utility disputes.

No Rise In Minimum Wage

He thinks Congress will oppose collective bargaining rights for foremen; insist on wider injunctions in labor disputes. Also he predicted no increase in minimum wages; rent regulation by states and the inclusion of labor costs in farm parity formula. The speaker also anticipated a reduction in taxes and greater economy in government spending. However, unless there is some marked reduction in military expenditures, concerning which he questioned the advisability, the annual budget will continue heavy.

One effect of the election, he believes, is to definitely doom the remainder of the 21-point CIO program President Truman submitted to the last Congress; also early demobilization of wartime-created agencies and corporations.

Business is going to have six years to help restore the American way of life, Owen Brewster, United States senator from Maine, declared. "The hour-glass is set," he said; there will be two years under the present federal administration, and four years under a Republican administration. Of this much at least he was certain. But if the objective is not obtained by that time, it may be too late.

"Set your sights on 1952" he urged; and then, so he told his listeners, get out and sell American standards of living and production. Compare them with those of other countries, and sell them not only to employees, but to employees' families and to entire communities.

Looking ahead, he expressed confidence that the new Congress would obtain co-operation from the Truman administration in balancing the government budget. The President is sincere in this desire to strike such a balance, Senator Brewster believed.

While admitting that the Wagner act should come in for legislative consideration, he saw other labor problems pressing for action, which might be handled more effectively first.

The association passed a resolution calling for the repeal of the National Labor Relations Act in order "to promote and protect the interests of all American peoples; and to insure that they are served with equality of the law, and that free economy, representative government, individual rights, individual responsibilities, and the privileges of American citizenship are guaranteed equally to employers and employees for the benefit of the American people. . . ."

Asserting that "self-help" by employers is preferable to political action in restoring a balance of power in management-labor relationship, Stuart S. Ball, secretary and counsel, Montgomery Ward

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Detroit, Mich....The Foundries Materials Co.
Dallas, Texas.....Barada & Page, Inc.
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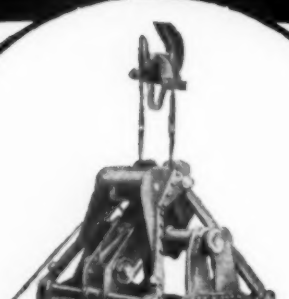

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& Co., Chicago, urged employers to fight for their rights. Discussing various available measures of redress, he said they include the suability of labor unions for breaches of contract or for damages due to illegal actions; redress against violence on the picket line; making employees assume the risk and share the economic consequences of a strike; and redress against libels and employers' rights of free speech.

Discussing trends of modern employee recreation programs, C. E. Brewer, National Recreation Association, New York, said the trend is away from management paternalism, with all the money coming from management and dominated by management. Activities should be as self-supporting as possible. He also said that the trend is away from the expenditure of large sums for plant-owned athletic fields and buildings. It is better for workers to use community facilities and engage in activities in the community in which they live.

Responsibilities of Supervisors

Dr. H. A. Vonachen, medical director, Caterpillar Tractor Co., Peoria, Ill., discussed the responsibilities of the plant supervisor and what is necessary to his being a capable supervisor. He also cited the problems confronting a doctor in a large industrial organization and stated that management should make him a close member of the official family.

The following members were elected to district committees of the National Founders Association:

First District: Howard A. Stockwell, Barbour Stockwell Co., Cambridge, Mass.; Henry C. Griggs, Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.; William Kay, Grinnell Corp., Providence, R. I.; C. Forbes Sargent, Sargent & Co., New Haven, Conn.; H. A. Davis, Fremont Casting Co., Worcester, Mass.

Second District: C. W. Pearson, Buflovak Equipment Division of Blaw-Knox Co., Buffalo; G. W. Hannay, Barnett Foundry & Machine Co., Irvington, N. J.; W. E. Thomas, Straight Line Foundry & Machine Co., Syracuse, N. Y.; A. W. Thompson, Ludlow Valve Mfg. Co. Inc., Troy, N. Y.; W. L. Hinds, Crouse-Hinds Co., Syracuse, N. Y.

Third District: William H. Forster Jr., Hays Mfg. Co., Erie, Pa.; J. R. Berg, Mesta Machine Co., Pittsburgh; Frank E. Walling, Lewis Foundry & Machine Co., Pittsburgh; George R. Casey, Treadwell Engineering Co., Easton, Pa.; C. S. Roberts, Dodge Steel Co., Philadelphia.

Fourth District: G. W. Cannon, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; James L. Wick Jr., Falcon Bronze Co., Youngstown; George Walton, Madison Foundry Co., Cleveland; Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich.; C. L. Lane, Lunkenheimer Co., Cincinnati.

Fifth District: C. N. Stone, Deere & Co., Moline, Ill.; E. L. Berry, Link-Belt Co., Chicago; Glenn B. McDonald, Iowa Steel & Iron Works, Grand Rapids, Mich.; C. B. Magrath, Greenlee Foundry Co., Chicago; A. V. Martens, Pekin Foundry & Mfg. Co., Pekin, Ill.

Sixth District: William S. Wood, Beloit Iron Works, Beloit, Wis.; J. D. McDonald, Vulcan Iron Works Ltd., Winnipeg, Canada; J. M. White, Allis-Chalmers Mfg. Co., Milwaukee; C. E. Stakey, D. J. Murray Mfg. Co., Wausau, Wis.; William J. Grede, Grede Foundries Inc., Milwaukee.

Seventh District: H. A. McLellan, Grinnell

Corp., Atlanta; H. W. Anderson, United States Pipe & Foundry Co., Chattanooga, Tenn.; John D. Capron, Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Ormond C. Corry, Harrison-Corry Co., Knoxville, Tenn.; Warren Whitney, James B. Clow & Sons, Birmingham.

OBITUARY

THOMAS C. HAMLIN, 55, superintendent of the Edwardsville, Ill., plant of U. S. Radiator Corp., Detroit, since 1923, died suddenly Aug. 2, at his home in Edwardsville. Mr. Hamlin, a native of Erie, Ill., promoted the Midwest Foundry Supply Co., Edwardsville and St. Louis, several years ago, and recently aided his sons, Thomas C. Jr. and Frank, in establishing the United States Casting Co., in the former city. Mr. Hamlin was elected chairman of the St. Louis District Chapter of the American Foundrymen's Association upon its formation in 1935 previously having served in like capacity with the former St. Louis District Foundrymen's Club.

• • •

Michael A. Bell, 66, president, M. A. Bell Co., St. Louis, died Oct. 22. Between 1903 and 1914 he was employed in the St. Louis and Detroit areas by companies allied with the foundry industry. He became affiliated with the E. J. Woodison Co., Detroit, in 1914 as a foundry supply and equipment salesman in its eastern territory and in 1916 opened the St. Louis-Southwestern branch for the company. In 1924 he was one of the organizers of the Independent Foundry Supply Co. which was reorganized as the M. A. Bell Co. in 1928. Mr. Bell was one of the charter members of the St. Louis Chapter, AFA.

• • •

Theodore M. Wood, 89, died at his home in Chambersburg, Pa., Oct. 25. Mr. Wood retired several years ago from the presidency of T. B. Wood's Sons Co., Chambersburg, founders and machinists, a business established by his father in 1857.

• • •

Guy P. Clow, 62, died at his home in Coshocton, O., Oct. 30. He was vice president of James B. Clow & Sons Co. and general manager of the company's Coshocton and Newcomerstown, O., plants.

• • •

George H. Manlove, connected with the Penton Publishing Co., Cleveland, since 1913, and associate editor of *Steel*, died Nov. 10, following a short illness. Mr. Manlove was a native of Lindsey, Kans., and a graduate of Hahnemann Homeopathic Medical College, Philadelphia, but entered the newspaper business in preference to practicing medicine. He joined the Penton company as district editor in Chicago where he also served for a number of years as secretary of the Chicago Foundrymen's Club. Since 1923 he had been located in Cleveland.

• • •

Samuel H. Moore, 65, sales engineer, National Bronze & Aluminum Foundry Co., Cleveland, died there Oct. 29. Mr. Moore, for many years president, Chisholm-Moore Mfg. Co., Cleveland, was a director of Glidden Co., Cleveland, at one time, and was one of the founders of Steel Improvement & Forge Co., Cleveland.

L. Edward Lortz, 82, former executive vice president, Fulton Iron Works Co., St. Louis, died there recently.

• • •

Calvin H. Taylor, assistant to the president, Strong Steel Foundry Co., Buffalo, died Oct. 14, in Philadelphia.

• • •

Dr. Leroy U. Gardner, 57, a pioneer in silicosis research and an international authority on the disease, died Oct. 23, in Saranac Lake, N. Y., where he has been director of the laboratory for the control of tuberculosis.

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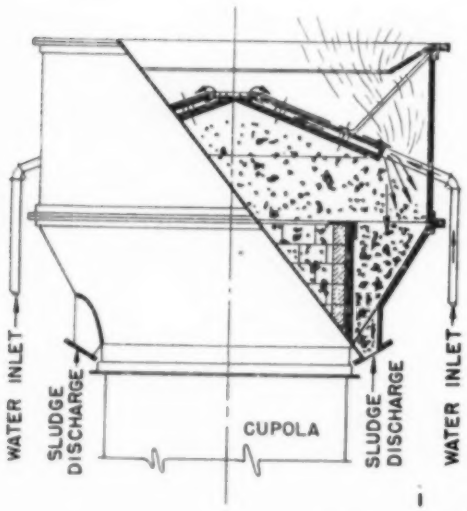
New Equipment *and* Supplies

(1)—Cupola Ash Collector:

C. C. Hermann & Associates, 5731 Somerset Drive, Detroit 24—Cupola fly ash collector is designed to fit all sizes of cupolas for the removal of cinders, fly ash and dust, and to quench existing sparks and flame. Apparatus also has application to electric furnaces, stacks, etc. Collector is a water-cooled cap which fits over and rests on top of the cupola stack. Water at about 40 psi is pumped upward at the rate of about 75 gpm for a No. 9 cupola through a conical water jacket, gushes out the top plate at the apex of the cone and is distributed evenly over the top surface. It then flows downward over the edge of the plate, forming a water curtain through which gases from the cupola must pass. Water keeps the cone cool and washes the solids down drains at each side of the unit. Equipment has no nozzles or moving parts, is constructed of steel, is easily installed and requires practically no attention or maintenance.



(2)—Testing Machine:

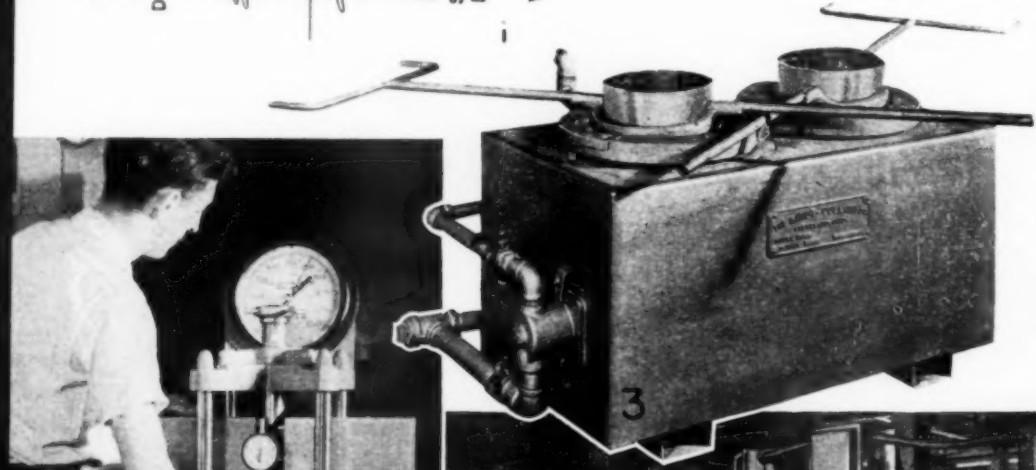
Steel City Testing Laboratory, 8843 Livernois Ave., Detroit 4—Hydraulically operated transverse testing machine is highly sensitive and is adaptable to making transverse tests with equal accuracy and efficiency on various specimens up to 10,000 lb. Specially constructed gage with maximum indicating hand remains stationary when the specimen breaks, permitting operator to get accurate reading even though he is not looking at the dial when the ultimate breaking point is reached. Load is automatically applied at speeds to suit the operator. Machine has 24 in. maximum span, 4 in. opening covers floor space 20 x 26 in. and is supplied with electric motor of requested voltage.

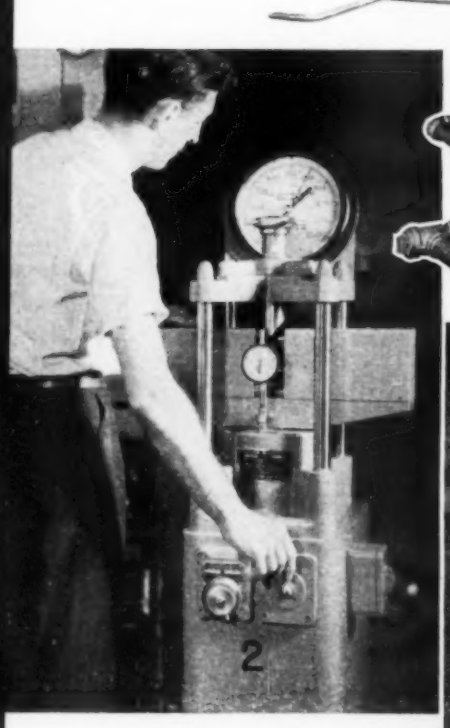
(3)—Aluminum Furnace:

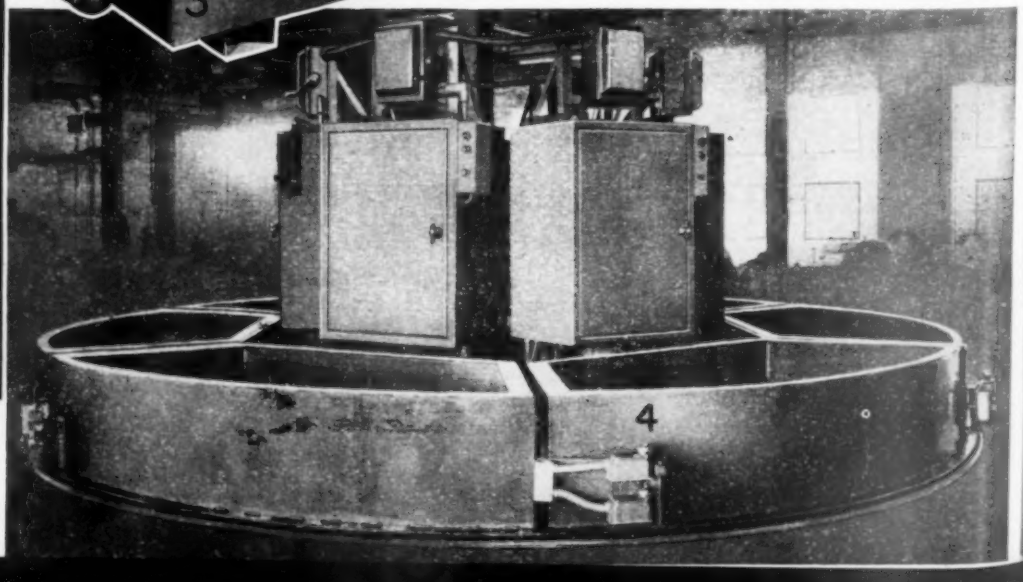
Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11—New aluminum melting furnace is designed for moderate production needs of pattern shops, schools, smaller foundries and as supplemental equipment for large foundries. Aluminum is melted in and poured directly from the heat-resisting alloy metal pot which is said to withstand more than 100 heats with reasonable care. Furnace is well insulated to assure maximum heat and quick melting, and is equipped with pilot light, bales, pots, motor, blower, etc. It is available in single units of 50-lb capacity or double units of 100-lb capacity, gas or oil fired and can be equipped for occasional melting of brass.

(4)—Centrifugal Machine:

Centrifugal Casting Machine Co., P. O. Box 947, Tulsa 1, Okla.—Centrifugal turntable type machine has six individual casting machines or spindles mounted on a 14-ft diam turntable. Designed for centrifugally casting welding rods, the machine can be used for any type high production centrifugal casting. Each spindle automatically is brought in turn to the pouring station,







the casting removal station, the mold preparation station, etc. Turntable is rotated by a chain drive and may be adjusted through ½ to 2 rpm. It may be stopped automatically for a preset period of time at each 60° so as to place each spindle at the proper station for the various casting operations. Each spindle is equipped with a separate 5 hp, electronically controlled, variable speed driving unit of speeds 0 to 600 rpm.

Furnace: Eclipse Fuel Engineering Co., 778 South Main St., Rockford, Ill.—Recirculating air-draw furnace is gas-fired, using an atmospheric burner with a comparatively rich primary mix-

ture, with enough air as a secondary supply to complete combustion. Burner is protected against electric and gas failures by an electronic flame-failure unit which prevents filling the work chamber or recirculating system with unburned gases. A panel safety control system is completely assembled and pretested at the factory and delivered for installation as a single unit.

Power Lift Unit: Lyon-Raymond Corp., 2906 Madison St., Greene, N. Y.—Hydraulic power unit for the company's hydraulic high lift trucks is designed for stacking or tiering where speed of elevation is important. Unit is self-contained, consisting of electric motor, hydraulic gear type pump, valves, oil reservoir and necessary controls. It is available with either ½ or ¾ hp motor, depending upon the capacity of the truck and speed of elevation required. Factory-adjusted relief valve in the hydraulic system eliminates danger of overloading.

Rectifier: W. Green Electric Co. Inc., 130 Cedar St., New York—Portable rectifier is a complete dc power supply source with capacity of 150 watts and is suitable for laboratory and industrial applications and battery charging. Output

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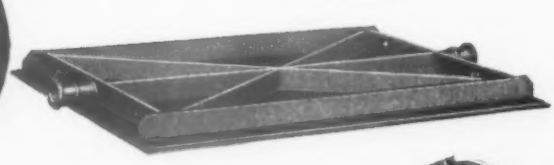

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Gantry Crane: Industrial Equipment Co., 315 North Ada St., Chicago 7—Portability, ease in handling and flexibility for many varied lifting services are the features of this new gantry crane.

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Die Casting: Light Metal Machinery Inc., Penton Bldg., Cleveland—Fully automatic, high speed die casting machine for production of zinc, lead and tin castings eliminates between-cycle delays by a cycling mechanism providing for automatic die movement, shot and ejection in continuously repetitive cycles. Shot capacity is 16 oz with a casting area of 30 sq in., and machine may be operated at any one of four fixed speeds—240, 330, 520 or 720 shots per hr. Complete die change and setup may be made in 15 min.; pressure pot assembly may be replaced in 30 min. and bolster plate bearing sleeves in less than one hour.

Adhesive: E. I. du Pont de Nemours & Co., Finishes Division, Wilmington 98, Del.—New liquid adhesive requiring no catalyst or special preparation for use, has a 6 months minimum package stability with no tendency to gel within a year. Adhesive is tough and flexible, suitable for bonding metal foils and metal sheets to wood, plastics, rubber, etc. Known as No. 4665 cement, it can be applied without thinning, by brushing, roller coating, knife coating or dipping. It is not attacked by petroleum or coal tar solvents, lubricating oils, alcohols, ethylene glycol or vegetable oils, and is resistant to dilute alkalis, acids and corrosive salt solutions.

Wheels: Palmer Mfg. Co., 8115 Clinton Rd., Cleveland—Rubber tired steel utility wheels for industrial wagons, carts, mobile fire-fighting units, dollies, mobile engine racks, acetylene tank carts and the like are load tested to over 1000 lb. Patented wheel-mounting device employs no cross axle and therefore does not limit width or stability in vehicle design. Solid rubber tires will not loosen or slip at wheel rim. Wheels are sold in 5½ and 8 in. diam in sets of four with stamped steel assembly fixtures included, or singly with both ½ and ⅝ in. bushings.

Work Positioner: Garfield Engineering Corp., Kansas City, Mo.—Universal work positioner holds and positions virtually all kinds of benchwork quickly and easily for production, assemble, service and maintenance. It provides ready access to all sides of the work, leaves worker's both hands free and reduces hazard of injury and damage by properly positioning the work which may be turned through 360° horizontally and 180° on vertical planes. Work is locked in position

by fingertip adjustment of pressure control knob. Positioner is available in mechanical or hydraulic models (shown here) with universal attachments for mounting many types of work.

Welding Alloy: Eutectic Welding Alloys Corp., 40 Worth St., New York 13—Known as EutecRod 1801, this alloy provides high strength welds on ferrous and nonferrous metals at a low melting point. Applied by the oxyacetylene torch, furnace, or high frequency induction heating equipment, it bonds at base metal temperatures of 940-1120 F, and melts at 1143 F. Weld deposits

have a shear strength of 120,000 psi, good corrosion resistance and electrical conductivity. Available in rod, wire, strip and powder form, it is used with a special, high quality flux.

Pressure Blower: Moore Co., 544 Westport Rd., Kansas City 2, Mo.—Direct drive, corrosion resistant, axial flow, pressure blowers are used in industrial ventilating applications where a large volume of low pressure air is needed. Feature of the blowers is the fabricated monel metal construction incorporating spherical hub and ring construction permitting each blower to be "tailor made" to pro-

vide maximum efficiency for each set of performance requirements without additional cost. Blower motors in speeds from 300 to 1800 rpm and 1 to 60 hp are weatherproof, nonoverloading, have no gears or belts, and the rotor is carried on permanently sealed ball bearings requiring no maintenance. A 16-in. hub blower is available in 36 to 60 in. diam delivering up to 40,000 cfm, and a 24 in. hub blower in 4 to 8 ft diam delivering up to 100,000 cfm will be available about Jan. 1.

Fire Extinguisher: Fire Extinguisher Division, Ansul Chemical Co., Marinette, Wis.—Advantages claimed for this new dry chemical extinguisher are: Simplified and faster operation, quicker and easier on-the-spot recharge, greater heat-shielding protection for the operator, expert extinguishing by inexperienced operators and greater capacity without increased weight. Approved by Underwriters' Laboratories and Factory Mutual Laboratories.

Electric Motors: Allis-Chalmers Mfg. Co., Milwaukee—New line of weather-proof, totally enclosed motors in the larger sizes ranging up to and above 2000 hp have completely redesigned ventilation heat-transfer systems. All air passages are practically self-cleaning and pockets in which water or liquid might be trapped have been eliminated. Air passage tubes can be easily cleaned with a brush or air or water hose.

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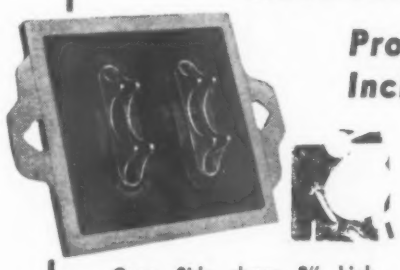

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FLUIDITY TESTING OF FOUNDRY ALLOYS

(*Continued from page* 96)

molded in a two-part flask, it is almost essential that the pattern be mounted on a board. Obviously, if the board is more than 60 in. long, as is required when the previously recommended flow-channels are made straight, there is much more opportunity for distortion during handling and storage of the pattern or during ramming of the sand than if the flow-channel is formed as a spiral. Even though the cross-sectional dimensions are assumed to be as large as ½ x ½ in., a distortion of the board of as little as 0.025-in. causes a variation of 5 per cent in the cross-sectional area. Surely, if only one condition of the test is subject to errors of this order, close control of other unavoidable errors would not be sufficient to make the test reproducible within reasonable limits.

Another advantage of the spiral flow-channel is in levelling the mold. In any laboratory determination where the highest precision is desirable, test molds should be levelled carefully, regardless of the mold design. However, for quality control in the shop, it appears desirable to make the test as insensitive to levelling as possible. In a case where one or more turns of the spiral are filled with molten metal, variations in pressure head caused by a slight inclination of the mold may be very nearly self-compensated. For control purposes at the U. S. Naval Research Laboratory, the spiral-type fluidity mold is levelled only by sight. It is placed upon a thin layer of sand in the bottom of a wheelbarrow. When it is desirable to make a fluidity test, the mold is wheeled to a convenient position and is poured without further preparation. This freedom would not be possible if a test piece with a straight flow-channel were employed.

Other advantages of the spiral flow-channel are that standard flask equipment may be used and the mold is small enough to be handled with ease.

Mold Material—Several of the foregoing arguments have been made on the assumption that green sand is the most desirable molding medium. This point deserves some discussion.

If a choice is to be made between a permanent mold of cast iron or steel and a sand mold for fluidity testing, there appears little room for argument. Permanent molds have an advantage in better opportunity for constancy of flow-channel dimensions. However, if scaling and pitting from repeated use are to be avoided when high melting point alloys are tested, a mold dressing must be applied. Since heat is carried away very rapidly by a metallic mold, variation in the thermal characteristics of the dressing cause a profound effect upon the time necessary to extract enough heat from the flowing metal to cause it to solidify, and therefore upon the indicated fluidity. Moreover, presence of any gas-forming material in a mold dressing is a probable cause of erroneous test results since a permanent mold has no permeability and entrapped gas causes unpredictable retardation or acceleration of the metal flow.

The choice between green and dry sand molds or baked core-sand assemblies is more difficult to make. An obvious difficulty with core assemblies is warpage of one half of the mold in relation to the other half which occurs during baking. Unless the cores are baked as assembled in supporting frames which are retained in position until the test mold has been used, this warpage is apt to cause run-outs and unreliable test results. Such difficulties are not experienced in the use of straight flow-channels if corrosion-resistant straight rods are baked in the sand and are removed later, as was done by Kron and Lorig[78] who used a modification of Ruff's method for their fluidity studies.

Green Sand Satisfactory

Green sand molds are more economical than baked sand molds, and several investigators believe them entirely satisfactory if the following precautions are observed. (1) The bond strength of the sand must be adequate so that sand is not eroded by the flowing metal. (2) The sand must be permeable enough so that steam formed by rapid heating of water in the sand can escape easily and does not exert pressure upon the metal. In this connection, it is deemed advisable to provide an ample vent at the end of the flow-channel to prevent development of gas pressure ahead of the flowing metal.

Whether or not normal variations in moisture content of a sand have appreciable effects upon chilling action of the mold has been considered by several investigators. Curry[23] reported that variations from 3 to 7 per cent appeared to make little difference in the measured fluidity. Some differences were ascribed to variations of the moisture content of the molding sand by Saeger and Krynitsky[35]. Greaves[38] stated that moisture content of the sand seems to have little effect upon chilling of the metal unless it has flowed over a considerable area of the mold cavity. Taylor, Rominski, and Briggs[50] found no significant differences in fluidity as the moisture content of the sand was changed. If one is inclined to prefer a baked sand mold on the basis of freedom from moisture, the possibility of water absorption during storage should not be overlooked; Berger[53] summarized

the situation in this regard by saying that it is easier to keep the moisture of green sand constant than to maintain dryness of cores and dried sand molds.

Ruff[85] conducted a study of metal flow in narrow channels to determine the effect of surface conditions of the mold cavity. For purposes of standardization of the fluidity test, a detailed treatment of these factors does not seem necessary. However, it appears desirable, for the sake of uniformity, to specify the grain size of the sand within fairly narrow limits. Silica sand with an AFA grain size number of 80 plus or minus 5 should be suitable if it does not contain abnormal quantities of silt and is so bonded that the permeability is not less than 75 by the AFA permeability test.

Temperature of Mold—The rate of heat flow from the metal varies with the initial temperature of the fluidity mold and it is to be expected that fluidity measurements would also vary with the temperature of the mold. However, Courty[20] has shown, Fig. 4, that fluidity values of aluminum-base alloys determined in cast iron molds are not increased appreciably even though the molds are heated considerably above that temperature which can be expected from climatic variations. Therefore, it is believed necessary to specify only that the standard fluidity test mold be at room temperature at the time of test.

Gating Method—Ideally, the system of gating should be so designed that metal is available at the entry of the flow-channel under a constant pressure head and without appreciable inertia. Such an ideal could be achieved only by having a reservoir of liquid immediately adjacent to the flow-channel with a quick-opening valve at the point of its entry and by providing a constant pressure head on the reservoir. Successful operation of a quick-opening valve in molten metal at this position in the mold is a practical impossibility. Therefore, ideal gating conditions must be approached as nearly as possible by other means.

Ruff[85] conducted some experiments in which several details of gating were varied simultaneously. Table I, taken from his paper, is reproduced here. His test results indicate that a horn gate is not suitable for introduction of steel into the flow-channel. Carapella and Shaw[104] were also concerned about the influence of a horn gate upon fluidity tests conducted with magnesium alloys. They have reported that better sensitivity was obtained by replacing the horn gate with a vertical down gate centered over a small basin from which entry to the flow-channel was made.

Cross-sectional area of the sprue must be considerably larger than that of the flow-channel. In this way, velocity of the metal is very low before it enters the

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channel and some turbulence avoided. Courty[29] has shown that less than 1 second is required for an aluminum-silicon alloy to run 50 cm in a chill mold containing a spiral flow-channel with a cross-sectional area of approximately 1/12 sq in. Although the duration of flow is probably somewhat longer in a sand mold, it is still short enough to require that the sprue be filled as rapidly as possible after pouring is started. In the absence of a valve mechanism, the pressure head causing flow is variable while the sprue is being filled. Therefore, if the sprue is comparatively small so that it is filled quickly, inconsistencies in test results from this cause are held to a minimum. It is recommended that the ratio of cross-sectional areas of down-gate to flow-channel be approximately 6 to 1 although it is recognized that the ratio can be changed somewhat from this value without affecting the test perceptibly.

From Ruff's[65] work and that of other investigators it is apparent that a large basin at the bottom of the down gate has no useful purpose in fluidity testing. It seems desirable only to have an enlargement of the sprue as a part of the channel pattern to prevent a mismatch when the sprue is molded.

Pressure Head—If variations of the pressure head which occur during filling of the sprue be neglected and if it be considered that the sprue is kept exactly full during the period of test, the force acting to cause flow in the channel is determined by height of the sprue and by density of the metal. After dimensions of the flow-channel and the mold material have been selected, the height of the sprue must be fixed within certain limits so that the test is reasonably sensitive but so that even the most fluid metals will not flow completely through the channel. For example, from Ruff's[65] preliminary experiments with Saeger and Krynitsky's[28] test-piece (Table I), it is apparent that length of spiral was not sufficient with methods of gating *D* and *E*. Even with methods *B* and *C*, the malleable iron flowed very nearly to the end of the 60-in. spiral. Under these conditions, the test is not satisfactory.

The sprue should be short for convenience of molding and for prevention of sand erosion and metal turbulence. It is recommended that height of the effective head be established within the range of 1 to 2½ in. if sand molds are used with flow-channels having dimensions within the limits previously recommended. All investigators who used flow-channels of that approximate size also used pressure heads within these limits except Greaves[66]. He employed a sprue approximately 6 in. high but did not make any provision for maintenance of a relatively constant pressure head.

From a comparison of the densities of aluminum and magnesium with those of iron-base and copper-base alloys the question of the necessity for changing the height of the sprue is raised if one standard test piece is to be applicable to all alloys. Density is less effective in changing the conditions of test than might be expected. Carapella and Shaw[101] used a test piece for measuring the fluidity of magnesium alloys which is similar to that developed by Saeger and Krynitsky[28] except they substituted a simple sprue for the horn gate. Detailed dimensions are not given in their paper but the effective height of the sprue is apparently unaltered. However, their plotted data indicate that the test is both sensitive and reproducible. Further, as has been stated, it is known by the writer that the test piece designed by Taylor, Rominski, and Briggs[59] has been used satisfactorily for the measurement of fluidity of aluminum alloys.

Pouring Basins and Overflow—It is recommended that a pouring basin be provided in the standard fluidity test mold for two reasons. (1) The kinetic energy of the metal being poured is largely dissipated in the pouring basin before it enters the sprue. (2) A pouring basin is an excellent location for temperature measurement of the metal in laboratory tests.

A few investigators of fluidity have taken elaborate precautions to dissipate the kinetic energy of the metal before it enters the sprue. A clever device developed for this purpose is that used by Courty[29] who measured the fluidity of aluminum alloys in the test mold shown by Fig. 10. The sprue is stoppered by two fusible lead plugs. Time of melting of the plugs is regulated by the thickness. Since lead has a much higher density than aluminum and since the metals have practically no solubility for each other, the lead collects on the bottom of the comparatively large basin below the sprue and does not interfere with the test. This arrangement, while well designed for the intended use, could not be considered for a standard fluidity test because it does not appear practical for alloys with high melting points and is too complex for use as a quality control test in the shop.

Some investigators have poured metal directly into the sprue of the test mold. This practice does not seem to be desirable because the kinetic energy of the metal being poured is transmitted directly to that entering flow-channel. Moreover, it is apt to cause excessive and uncontrolled turbulence. If the test were to be reasonably reproducible under these conditions, metal would have to be poured exactly from the same height and at exactly the same rate, each time.

These variables are difficult to con-

trol and it is advisable to follow the methods employed by a number of the more recent investigators; namely, to design the test mold with a pouring basin which discharges into the sprue at a fixed height above the plane of the flow-channel and which overflows into another basin at a small, fixed height above the plane of entry to the sprue. Thus, if a high rate of pouring is employed so the sprue fills very quickly and remains filled, the pressure head is kept constant within the limits set by the difference between the two discharge levels. The shortest interval between discharge levels in any of the work reported is 1/4-in., which is the distance employed by Andrew, Percival and Bottomley[27] and by Taylor, Rominski, and Briggs[39]. The latter test mold has been used widely enough to indicate that this dimension is ample although it obviously could not be much less than ¼-in.

If the amount of metal to be used for a fluidity test is to be kept reasonably small, the pouring basin cannot be very large. However, from the standpoint of dissipation of kinetic energy of the metal being poured, it is desirable to employ a fairly large basin. Moreover, it is essential that the pouring basin be larger than a certain minimum size so that temperature measurements can be taken therein.

Skimmers—It is well known that the presence of slag and dross has a pronounced effect upon the apparent fluidity of a metal. Since effect is more noticeable with some nonferrous alloys than with iron base alloys, few investigators who have worked with irons and steels have given attention to skimming devices. However, if a standard fluidity test is to be specified for all of the commonly cast metals, it appears essential that some means be provided in the gating system to prevent floating, nonmetallic material from entering the flow-channel.

A strainer core can be inserted in the sprue in the manner employed by Curry[23] and others. However, unless the openings through the core have a total cross-sectional area sufficient to allow rapid filling of the sprue, it is believed that some of the reproducibility of the test is lost. Since the core must have some strength and, therefore, be relatively large in comparison with the total area of the openings, the cross-sectional area of the sprue must be considerably larger above the core than below it. Therefore, the sprue fills to a constant level less rapidly with a strainer core than without it even though no constriction is caused by it. Moreover, the core acts to chill the metal somewhat and it is desirable to keep the chilling action to a minimum.

Since it has been recommended that a pouring basin be made in the mold, a modification of the skimming device used

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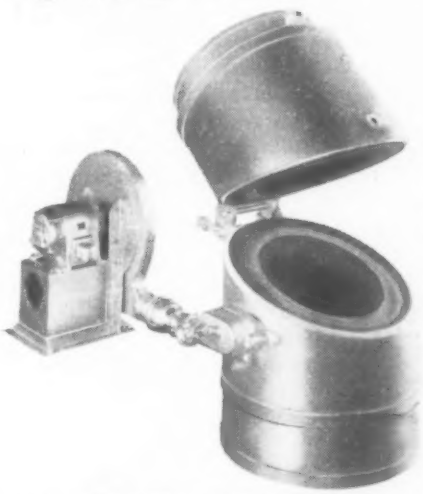

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by Mott, Schaefer, and Cook[108] is believed satisfactory for skimming dross and slag from the metal. A photograph of a fluidity casting taken from their report, is reproduced in Fig. 2. The suggested modification is that the section between the skimmer and the sprue be reduced to allow it to fill more completely before metal enters the sprue.

Temperature Measurement — For fluidity testing in the laboratory, accurate measurement of the metal temperature is important because temperature has such a profound effect upon fluidity irrespective of other conditions which may alter it. Some of the inconsistencies in reported data are probably due to errors of temperature measurement. Even if the temperature of the metal is measured accurately in the furnace or in the ladle before the sample is poured into the mold, the metal can be chilled considerably as it is transferred. For laboratory tests, it is desirable to measure temperature of the metal in the fluidity mold itself.

Mott, Schaefer, and Cook[108] have used a method which appears to be very reliable. Their technique is to place the hot junction of a platinum, platinum-rhodium thermocouple in the pouring basin of the mold, Figs. 1 and 2, so that the temperature of the metal can be taken just before it enters the sprue. For this technique to be successful it is required that the couple respond very rapidly and the indicator or recorder be equally responsive. These investigators used a spot-welded couple with the junction no larger than the elements. This couple was pulled through a single-bore, fused-silicon sheath with very thin walls so that the thermal lag was not more than 4 or 5 seconds. A rapidly responding indicator was used with the couple. It is necessary to have metal flowing into the pouring basin for a period which is long enough for the couple to respond to the true temperature of the metal before it enters the sprue. This condition can be controlled by establishing suitable dimensions for the pouring-basin and by regulating the rate of pouring with a pouring-cup. Mott, Schaefer, and Cook used a pouring basin which is roughly cubical in shape, with the length of each edge approximately 4½ in.

Temperature measurements are not required for quality tests of fluidity in the shop. It should be emphasized again that useful information can be gained from this type of fluidity testing only by correlation of test results with observations of fluid performance of the metal on the casting floor for each shop. Therefore, the important thing to be observed in shop practice is that the metal be transferred to the test mold in exactly the same manner of each test.

For example, the procedure at the U. S. Naval Research Laboratory for making fluidity tests of steel in the arc furnace for control purposes is as follows: (1) the bath is rabbled just before a sample is taken, (2) 10-lb sampling spoon, initially dry and at room temperature, is slagged for a period of 10 seconds as the melter counts, "One-thousand and one, one-thousand and two, etc." (3) a spoonful of metal is dipped from a fixed position with respect to the electrodes and is withdrawn quickly, but not hurriedly, from the furnace, (4) the metal is deoxidized with a strip of aluminum unless the final additions have been made to the furnace and (5) the spoon is inverted just above the pouring cup which is centered over the pouring basin. Average deviation from the standard time cycle for steps 3, 4, and 5 is approximately 3 seconds.

Sampling from Bottom-Pour Ladles—When it is desirable to make fluidity tests from a bottom-pouring ladle, some provision must be made to deal with the extraordinary force of the metal as it comes from the nozzle.

Kron and Lorig[79] developed a test mold with which they were able to pour fluidity tests from a bottom-pouring ladle containing 27 tons of steel. The flow-channel of this mold is a modification of that developed by Ruff. Only a few tests were made with the mold and the data are insufficient to support a recommendation for its adoption.

Taylor, Rominski, and Briggs altered the pouring basin of their laboratory test mold and placed a baffle core between the pouring basin and the sprue so that samples of steel could be taken from a bottom-pouring ladle. Other details are the same as those of the test piece for laboratory work or tests on the melting floor where a sampling spoon is used to transfer the metal to the mold. A photograph of the pattern for this test mold is shown in Figs. 3A and 3B. Satisfactory tests were obtained with the large test piece and it is believed to be generally acceptable for use with a bottom-pouring ladle.

Shop Tests vs Laboratory Tests—The idea has been emphasized that one well designed test piece should be suitable for both shop tests and laboratory tests of fluidity. The flow-channel, sprue, and pressure head of molten metal should be identical in all cases. However, for the pouring basin, two or possibly three designs are necessary because of the differences in requirements of pouring methods. For laboratory tests, the pouring basin must be large enough so that accurate temperature measurements can be made of the metal as it enters the mold. The pouring basin of a mold which is to receive metal from a bottom-pouring ladle should also be large. By contrast, a smaller pouring basin is required for

shop tests if metal is to be removed from a furnace with a sampling spoon.

It is not suggested that shop tests can be made with the same control and care with which a laboratory test is conducted. However, it is believed that the results of fluidity testing, obtained from molds, having the same pressure head of molten metal, flow-channel and sprue, although the pouring basins are enough different in design to satisfy the requirements previously stated, would be sufficiently comparable so that operating personnel and laboratory personnel could exchange information and improve practice for the benefit of the industry.

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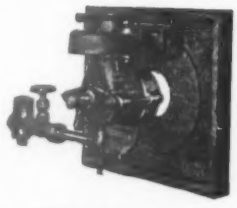

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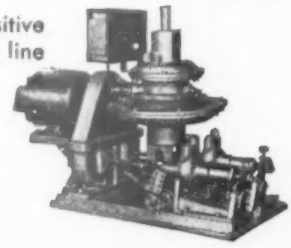

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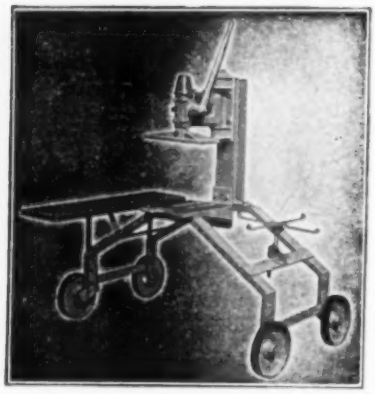

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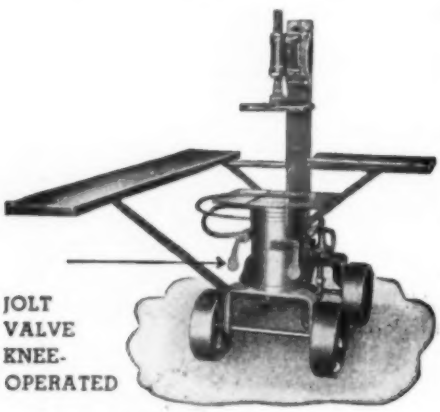

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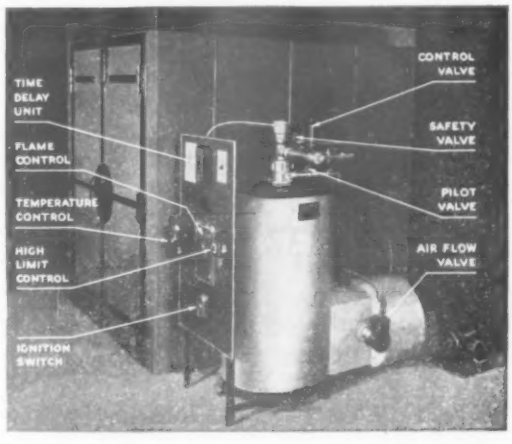

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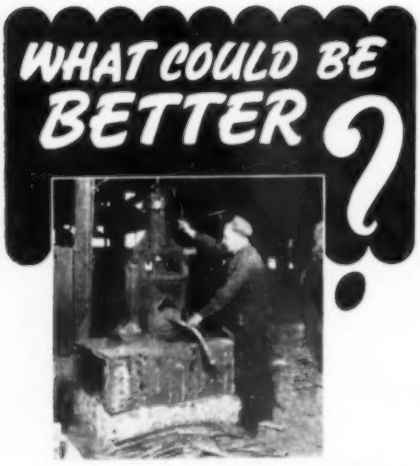

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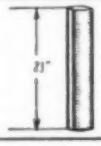

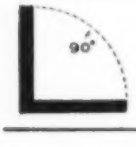

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HOT BLAST CUPOLA OPERATIONS ARE ANALYZED

(*Continued from page* 107)

ture curves in the true and apparent temperature bands do not coincide. This happens because one of the two Bioptix instruments had been in use for a long time. We get temperature conformity when both instruments are freshly standardized before use.

H. Jungbluth and P. A. Heller[9] found in melting with cold wind in an experimental cupola of 600 mm (24 in.) diameter that in about a 5.5 per cent coke charge, or 4.7 kg of C per 100 kg of iron, the formation of carbon monoxide could no longer take place, since the combustion ratio reaches the 100 value. We placed before ourselves the task of investigating whether these ratios observed by Jungbluth and Heller become manifest also for hot blast cupolas. With lower coke charges and correspondingly higher blast temperatures of 500 to 600 C (930 to 1110 F) will the CO_2 content in the furnace gas more and more approach the 21 per cent value?

If we observe the curves of Fig. 5, we can ascertain that, up to a blast temperature of 300 to 400 C (570 to 750 F), the proportion of carbon dioxide in the furnace gas increases. If we raise the blast temperature to 500 to 600 C (930 to 1110 F), then, in spite of lowering the coke charge further, we establish no further increase of the CO_2 in the furnace gas. Also, in a minimum coke charge of 5 to 6 per cent, the reduction of carbon dioxide could not be entirely prevented since the highest carbon dioxide value is never above 17 to 18 per cent.

The temperatures observed at the level of the tuyeres are much higher in the hot blast cupola than in the cold blast. It is therefore not out of question that the carbon dioxide in hot blast melting is reduced faster and more strongly than in cold blast melting.

Jungbluth has proved that a relationship exists between the combustion ratio Nv and the coke size. Our experiments confirm his correlation. A smaller coke size gave a poorer Nv, because the reaction $CO_2 + C = 2\ CO$ is favored by the increase in the surface area of the coke.

Effect of the Hot Blast on Melting

1. If, in the melting of malleable iron in the hot blast cupola, the blast temperature is raised from 0 to 600 C (32 to 1110 F), the coke charge can be lowered from 13 to about 6 per cent. According to Fig. 6, if we deduct the carbon for carburization, only about 5 kg of carbon per 100 kg of of iron, instead of 11.2 kg of carbon per 100 kg of iron, are at our disposal. In this connection, we would like to point to the fact that the experiments discussed here were carried out with first-class foundry coke. With the quality of coke at our disposal today the ratios, as they are shown in Fig. 6, are not so favorable for the hot blast cupola. However, they are still less favorable in melting with a cold blast.

2. If we lower the coke charge from 13 to 6 per cent and hold the wind volume constant, the melting capacity is raised about 100 per cent.

3. In the same manner, if we reduce the coke ratio, the thermal efficiency of the cupola improves in accordance with the values shown in Fig. 8.

4. In the hot blast cupola we distinguish between three thermal efficiencies: Thermal efficiency of the cupola, thermal efficiency of the preheater, thermal efficiency of the entire setup.

Since our Schack-type preheater works at a very high thermal efficiency of 75 to 85 per cent, it is most suitable for the execution of our experiments. At the lowest coke charge of 5/15 per cent, the thermal efficiency of the cupola amounts to about 72 per cent, according to Fig. 8, and the thermal efficiency of the entire arrangement is about 68 per cent. With a 6 per cent coke ratio the thermal efficiency of the whole system was found by calculation to be 59 per cent.

5. According to our experiments, it is not to be claimed that, relative to the conduct of the furnace operation, a preferred blast temperature exists. Of particular interest is the blast temper-

ature at which the ignition temperature of the coke is attained. At this temperature the melting zone shifts downward and comes to be situated directly above the tuyeres. In general, it may be said that for each blast temperature and corresponding coke ratio, an iron can be melted that will be fit for use in the foundry.

6. By means of temperature measurments with the Bioptix we have determined that a relationship between iron temperature and silicon content of malleable iron exists.

7. Fig. 7 shows that the hot blast cupola, as compared to the cold blast, effects greater savings in coke, as the coke ratio in the hot blast cupola can be reduced. The costs of anthracite coke and gas are used as the basis for computing total cost.

8. With a blast temperature of 500 to 600 C (930 to 1110 F) the exhaust gas temperature as measured with the aid of a flow-type pyrometer amounts to only 180 to 200 C (320 to 390 F) with the throat of the furnace closed. The same measurement in the case of cold blast practice gives a temperature of 400 C (750 F).

9. In regard to loss of manganese and silicon in melting, the hot blast cupola is somewhat better than the cold blast.

10. In summary, it can be said that our test results are identical with those obtained by E. Piwowarsky with his hot blast cupola in Aachen.

Effect on Furnace Refractories—A useful furnace refractory is required to be as resistant as possible, first, to the chemical effect of the acid slag, and secondly, to the mechanical abrasion of the descending iron and coke charges. Since in melting with a hot blast of about 600 C (1110 F) the melting capacity can be increased about 100 per cent, it is understandable that melting at a rate of 4 to 6 tons for a run of 10 to 11 hours places extraordinarily heavy requirements on the refractories.

It is recognized that in melting with a cold blast the coke near the tuyeres is cooled so much that full combustion takes place somewhat farther back in the interior of the furnace. But in melting with high blast temperatures in a hot blast cupola, we observed an extraordinarily strong generation of heat near the tuyeres. For reasons of security in melting with blast temperatures of 500 to 600 C (930 to 1110F) and over, the tuyeres can be water cooled; or a cooling system can be built into the brickwork of the furnace at the level of the melting zone in such a way that the tuyeres will be included in the cooled region.

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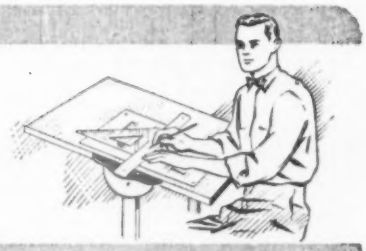

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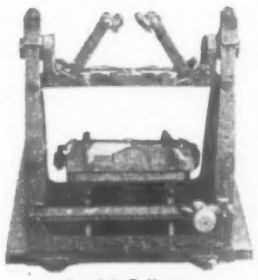

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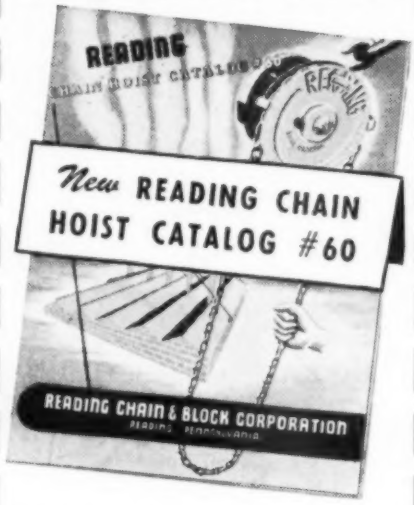

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peratures and the attack of the acid cupola slag, it does not appear out of question that blast temperatures of 700 to 800 C (1290 to 1470 F) will be used later on in melting in the hot blast cupola. At these blast temperatures the thermal efficiency of the cupola would be increased still further because the coke ratio required would be only 3 to 4 per cent. Since the proportion of iron in the furnace practically reaches a maximum at these low coke ratios, the possibility exists that the carbon dioxide in the furnace gases will be only immaterially reduced.

Effect of the Hot Blast on Malleable Iron—We have already shown in detail that by changing the distance from the bottom to the lower edge of the tuyeres we have a positive means of melting a malleable iron with a prescribed carbon content. Special malleable irons distinguish themselves through their low sulphur content. Normal malleable, melted in the cupola with about 13 to 15 per cent coke, shows a sulphur content of about 0.25 to 0.30 per cent. A certain sulphur content is desirable in fittings to guarantee clean-cut threads. In melting with a hot blast of 300 C (570 F), a malleable iron with a sulphur content of 0.20 per cent was obtained, and with a hot blast of 600 C (1110 F) the sulphur content was 0.16 per cent.

In accordance with the heat treatment selected, the hot blast malleable iron shows exactly the same structure as cold blast malleable. The average strength of normal malleable iron measured on test bars having a gage length of 36 mm and a diameter of 12 mm amounts to: Tensile strength, 48 kg per sq mm (68,300 psi); elastic limit, 32 kg per sq mm (45,500 psi); elongation, 12 per cent.

In the case of hot blast malleable as compared to cold blast malleable, an increase of tensile strength and elastic limit with constant elongation was established. Average values gave: Tensile strength, 48 to 53 kg per sq mm (68,300 to 75,400 psi); elastic limit, 35 to 38 kg per sq mm (49,800 to 54,100 psi); elongation, 10 to 12 per cent.

Summary — Our practical large-scale tests show that in the hot blast cupola as proposed by Piwowarsky, malleable iron can be melted more economically and with better properties without being committed to the difficulties encountered in the processing of normal malleable fittings and jobbing castings.

In the course of 43 heats, 826,487 kg (1,818,271 lb) of malleable iron was melted in the 600-mm (24-in.) diameter experimental cupola. On the basis of these test results, our firm in Schaffhausen has converted four cupolas with diameters of 700 to 900 mm (27 to 36 in.) to hot blast melting.

From the middle of September, 1941, to the present time these cupolas have been operated with hot blast only, and several thousand tons of malleable iron have been melted.

The hot blast cupola in its present design is still not at the end of development. In the hot blast cupola of the future the cupola gas will not be conveyed to the open air; but, as combustible gas, it will be led to the separately heated preheater where it will be burned. In such a hot blast cupola the highest thermal efficiency will be attained because it will make the maximum use of all fuels which we introduce in the cupola and the blast heater.

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GI's Run South Pacific Foundry

(*Continued from page* 109)

poured into a preheated container made from the inevitable oil-drum with clay lining and having two air inlets on the side slanting downward, toward the surface of the iron. The side-blow type of converter was used because the air supply had to come from two air compressors and it was believed that this high-pressure blast would blow the metal out of container if the bottom-blow type were used.

That the steelmaking attempt proved unsuccessful was attributed mainly to the small volume of molten iron available and its low heat capacity, with the added disadvantage of an insufficient volume of air supply. The heats froze over before they "lit off" and with the coke supply running low again, further attempts were abandoned.

Little, if any, metallurgical control was exercised on the metal melted in the foundry. No efficient deoxidizer could be found for eliminating gas holes in nonferrous castings. The only attempt at elimination of porosity involved control of the burner flame, scrap selection and, where circumstances permitted, pouring into skin-dried molds. The results proved erratic and as long as the porosity was not too dangerous to prohibit the use of the casting in service, the gas holes were given publicity to the uninitiated as a new invention—an alloy containing pockets for holding lubricating oils and for automatic entrapment of grit and other foreign particles.

Heat treatment of the iron castings was accomplished in an adobe-like, clay furnace, which also served as a core oven, and was only necessary when proper adjustment of the cupola blast and metal-coke ratio produced iron of poor machineability. Temperatures were measured by eye and the "Old Faithful" oil burner used for heat supply. Annealing and normalizing were the only heat treating cycles employed and hardnesses were measured with files or by ease of machining.

Field expedient was the password in this outfit. The fast-talking "Jimmy Durante" character was even able to convince an official inspecting party that their cache of Japanese saki was the best molding sand purifier to be found on the island and was vital to the operation of the foundry.

The end of the war was welcomed by these foundrymen, but when they were given orders to pack up for home, they left New Guinea with feelings of regret, for the island held the evidence of their sweat and toil and foundry enthusiasm. They nevertheless looked forward to returning to the States where labor-saving foundry equipment is available, where eight hours is a day's work and where a scrapped casting is no longer "one for Tojo."

Names AFA Research Committee

Blake M. Loring, senior metallurgist, U. S. Naval Research Laboratory, Washington, has been named chairman of the research committee, brass and bronze division, American Foundrymen's Association. Other members of the new committee are George P. Halliwell, director of research, H. Kramer & Co., Chicago; Dr. Robert M. Brick, director, department of metallurgy, University of Pennsylvania, Philadelphia; Clausen A. Robeck, vice president, Gibson & Kirk Co., Baltimore, and Dr. A. J. Smith, metallurgist, Lunkenheimer Co., Cincinnati.

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RUST PREVENTIVE: Rust-Oleum Corp., 2425 Oakton St., Evanston Ill.—Catalog states the qualities and engineering specifications of the company's war-seasoned rust preventive products for industrial, railroad, marine, farm and general uses. Problems of scientific rust control, directions for application and a chart of the colors in which the rust preventive are obtainable are contained in the catalog.

MACHINING ALUMINUM: Reynolds Metals Co., Dept. 47, 2500 South Third St., Louisville 1—124-page manual, "Machining Aluminum Alloys," has been prepared by Reynolds engineers. First five chapters contain a general discussion of machining characteristics of the various aluminum alloys; machining conditions; tool materials and designs; cuts, speeds and feeds; and lubricants, coolants and cutting compounds. Nine remaining chapters discuss different machining operations. Eight tables present recommendation data and procedures. Reynolds also offers an 87-page manual dealing with welding, brazing and soldering aluminum and aluminum alloys. Each manual is priced at $1.

ELECTRIC FURNACE: Hevi Duty Electric Co., Milwaukee—Bulletin HD 646 describes the company's carburizer-nitrider furnace and illustrates uses of the furnace in factory installations. Carburizing and nitriding processes are outlined and operation and specification charts are furnished. Use of the furnace for bright annealing of nonferrous metals, clean hardening of steel and clean annealing of steel, cast or malleable iron is also described.

HYDRAULIC POWER UNIT: Hydraulic Machinery Inc., 12825 Ford Rd., Dearborn, Mich.—Ten-page brochure describes hydraulic power units that may be adapted to any motion desired for new machines or for changeover to hydraulics. Applications include grinding, milling, boring, drilling, pressing, piercing and riveting—for feed and traverse of multiple or single tools.

AIR COMPRESSOR: Worthington Pump & Machinery Corp., Harrison, N. J.—Bulletin L-680-B1A describes and illustrates steam-driven compressors, intercoolers, aftercoolers, air receivers and the company's feather valve. Bulletin L-640-B1A deals with single horizontal air and gas compressors for optical drive arrangements.

WIRE ROPE: Preformed Wire Rope Information Bureau, 520 North Michigan Ave., Chicago 11—Booklet, "Preformed Wire Rope—What It Is—What It Does," tells the story of the development of preformed wire rope and explains in nontechnical language what the preforming process does to the wires in a rope and what effect it has on the rope's final service. A chart in the book shows the average difference in service life between preformed and nonpreformed wire rope on ten different machines.

MACHINING COOLANT: Oakite Products Inc., 57 Thames St. New York 6—Twenty-page manual describes advantages and economies of this specially compounded soluble oil in machining, cutting, grinding and related operations on ferrous and nonferrous metals. Starting point formulas for making up coolant emulsions are given for operations performed on steel, brass, aluminum and plastics. Manual also discusses addition agents for unusual and special machining problems on a wide range of work.

PROCESS CONTROL: Foxboro Co., Foxboro, Mass.—Bulletin 381 explains and illustrates features of the company's Model 40 controller. The operating-panel feature and the convenience of operation and maintenance achieved through unit construction and assembly is illustrated. Indicating models, as well as single and multiple-pen recorders are shown, and the five types of control action available in the Model 40 are explained.

ELECTRICAL EQUIPMENT: Electric Specialty Co., Stamford, Conn.—Catalog 46-1 describes special motors, generators, motor-generator units, converters, and other rotating electrical products. Because this equipment is built to specification and order, the catalog presents a general picture of the scope of the company's manufacturing ability rather than specific models with definite standard specifications.

GRINDERS: Bridgeport Safety Emery Wheel Co. Inc., Bridgeport, Conn.—Catalog 146 illustrates, describes—including specification tables—horizontal face, vertical surface, knife, floor stand, cutlery and special grinding machines as well as buffing lathes, cut-off machines and grinding wheels.

POLISHING CLOTH: Burrell Technical Supply Co., 1936 Fifth Ave., Pittsburgh 19—Folder quotes prices on abrasives and contains samples, sizes and prices of various polishing cloths.

MORTAR SHRINKAGE: Master Builders Co., 7016 Euclid Ave., Cleveland 3—34-page booklet, "The Action of Embeco in Concrete and Mortars," deals with shrinkage of concrete and mortar—its important influence on durability and serv-

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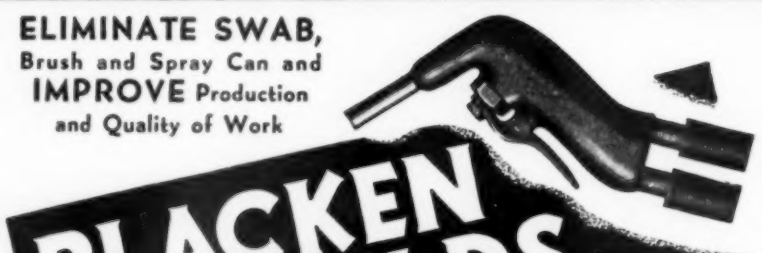

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iceability, the principal factors affecting it, and its control and elimination. Booklet explains the principle of specially prepared metallic aggregate in controlling shrinkage.

REMOTE CONTROL: Allis-Chalmers Mfg. Co., Dept. 686, Milwaukee 1—Bulletin 14B6641 deals with remote indicating and control systems—what they are and what they are capable of accomplishing. How the transmitter, receiver and indicator of such systems are constructed, how they work, their important advantages and specifications are graphically presented with photos, diagrams and charts. Systems can be used for remote control of valves, rheostats, potentiometers, governors, switching devices, combination sequence controls and indicating and signaling systems.

FLUORESCENT LIGHTING: Sylvania Electric Products Inc., Dept. MA-3, 211 Derby St., Salem, Mass.—80-page "Fluorescent Service & Maintenance Manual" contains full details on fluorescent lamp operation and problems in the maintenance of fluorescent systems. The pocket-sized manual has illustrations and diagrams of different circuits and test equipment which can be built in electrical shops as well as a glossary of fluorescent lighting terms. Price $1.

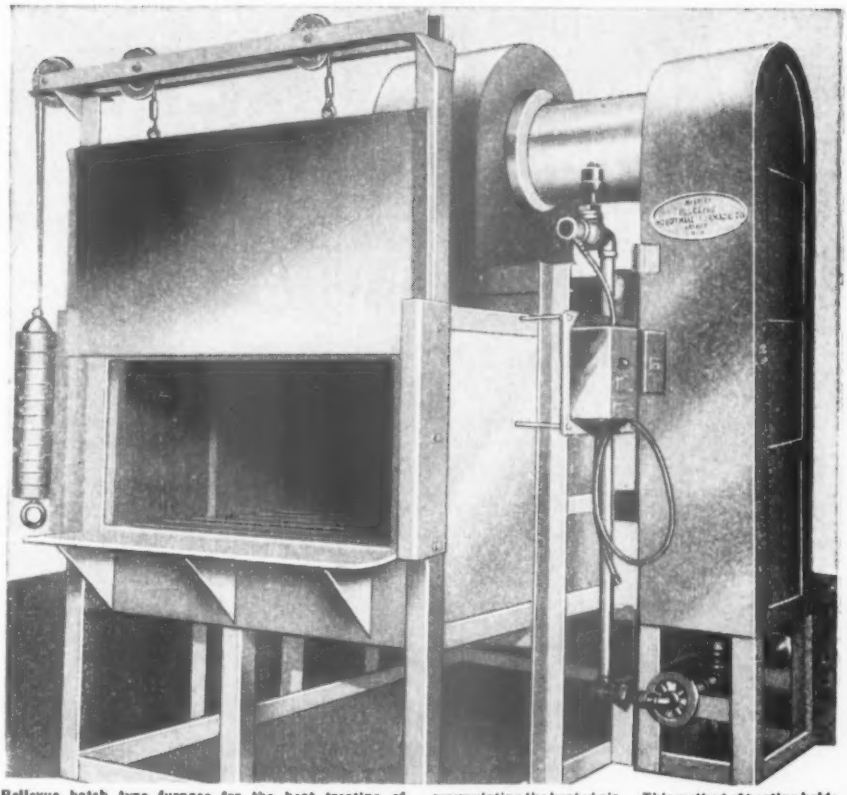
AIR TOOLS: Rotor Tool Co., 17325 Euclid Ave., Cleveland 12—Booklet No. 30 analyzes the costs of portable tool operations and suggests methods for cutting costs for nine types of portable tool operations. Information is given on where to use each basic type of portable tool, how to increase metal removal with each type and examples based on actual case histories. Specifications are given for Rotor's line of air-driven portable tools.

BLOWER: Roots-Connersville Blower Corp., 610 Madison Ave., Connersville, Ind.—Bulletin 120-B-13 covers centrifugal blowers and exhausters for various applications. Company's centrifugals are offered in single or multi-stage types with capacities up to 100,000 cfm, speeds of 3600 to 10,000 rpm and at pressures from the lowest to the highest practicable.

JACKS: Duff-Norton Mfg. Co., Box 1889, Pittsburgh 30—40-page illustrated catalog 203 gives descriptions, data and specifications of the company's line of lifting jacks. Ratchet, screw, air motor operated, hydraulic and journal jacks are discussed as well as an automatic lowering mechanism and an inverted type general purpose screw jack.

MASONRY DRILL: Metro Tool & Gage Co., 4240 West Peterson Ave., Chicago 30—Bulletin gives description, specifications and prices of new carbide tipped masonry drills which are said to drill faster and last longer than ordinary steels drills. For use in any portable electric drill they come in 3/16 to 1¼ in. diam.

GRID HEATERS: D. J. Murray Mfg. Co., Wausau, Wis.—Booklet gives details and capacity tables on grid unit heaters, with high test cast iron heating sections. One-piece cast heating sections withstand steam pressures up to 250 lb and resist corrosion.



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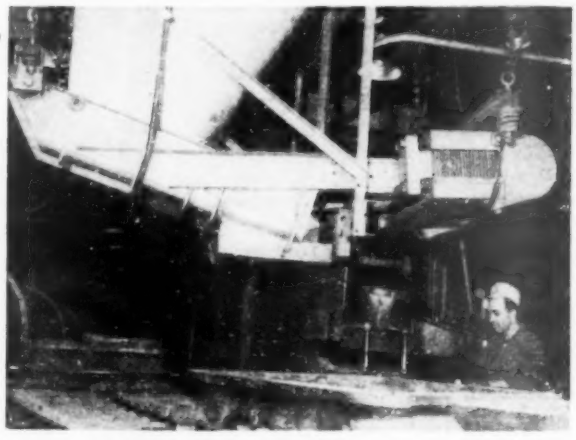

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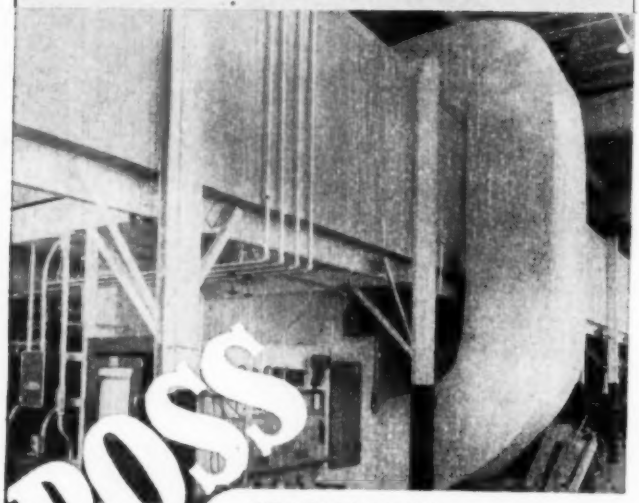

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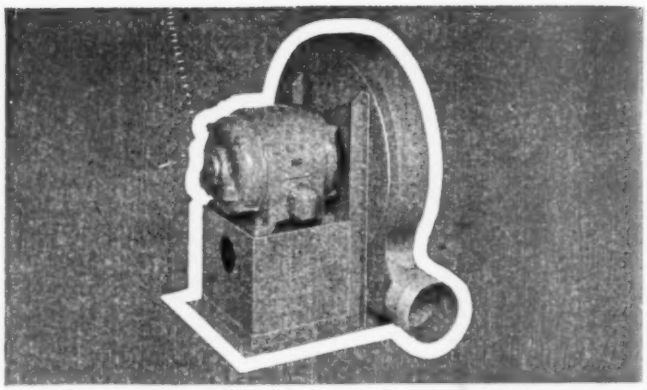

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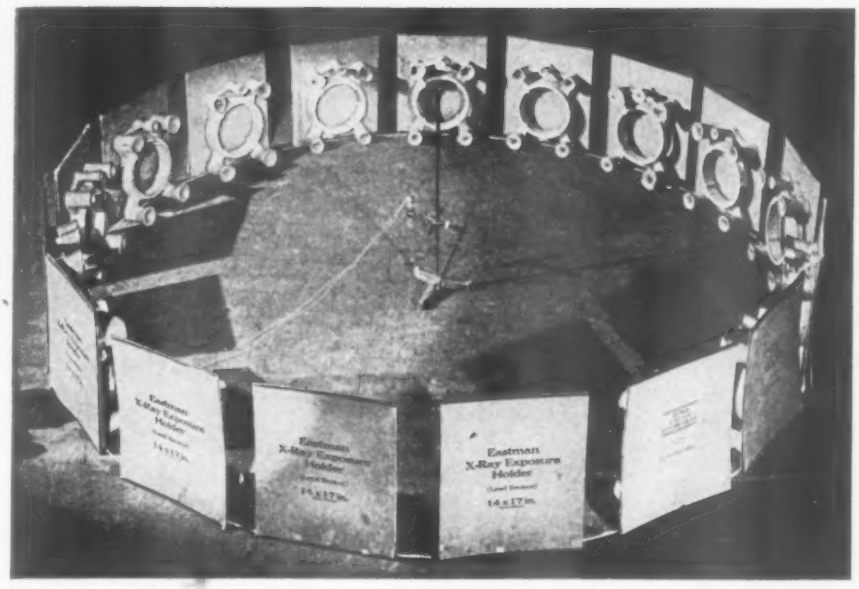

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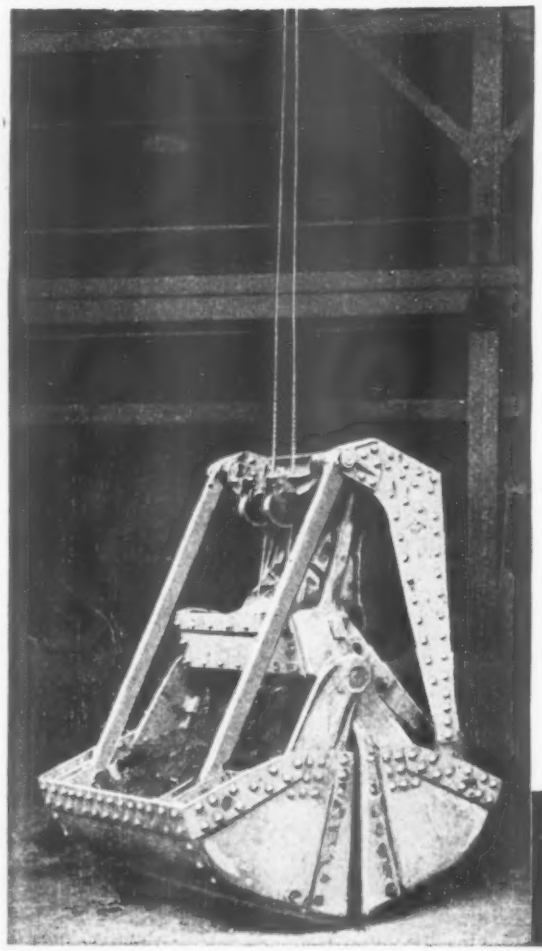

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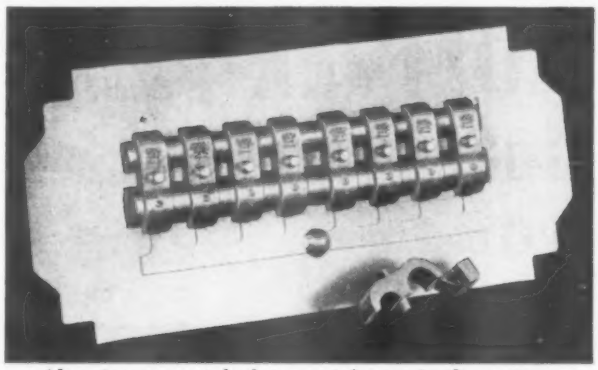

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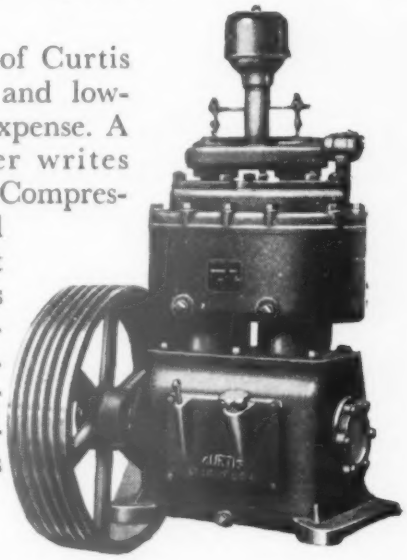

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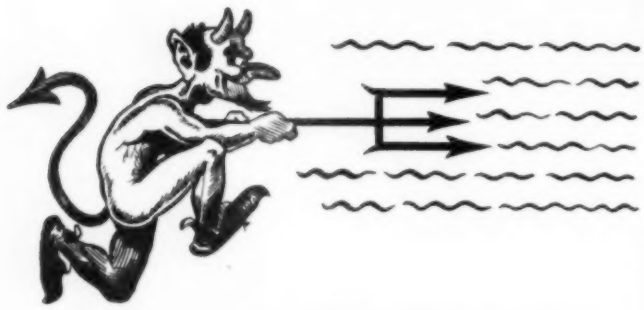

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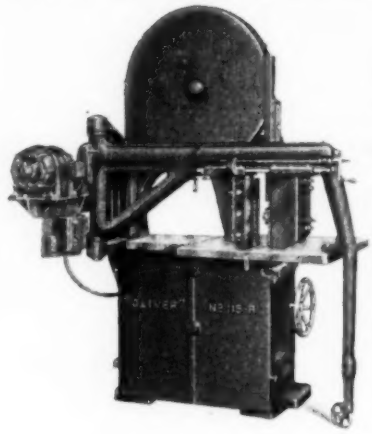

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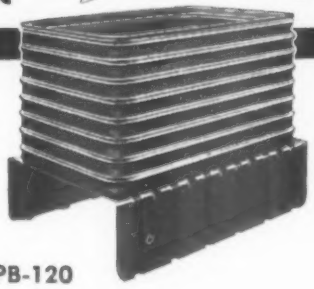

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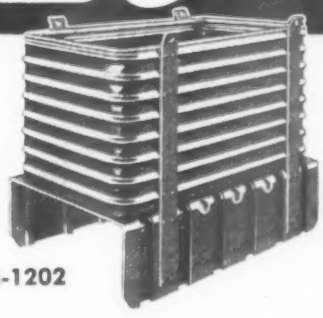

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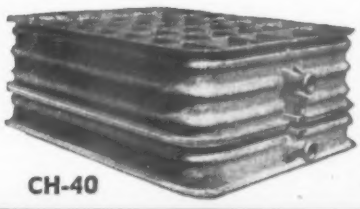

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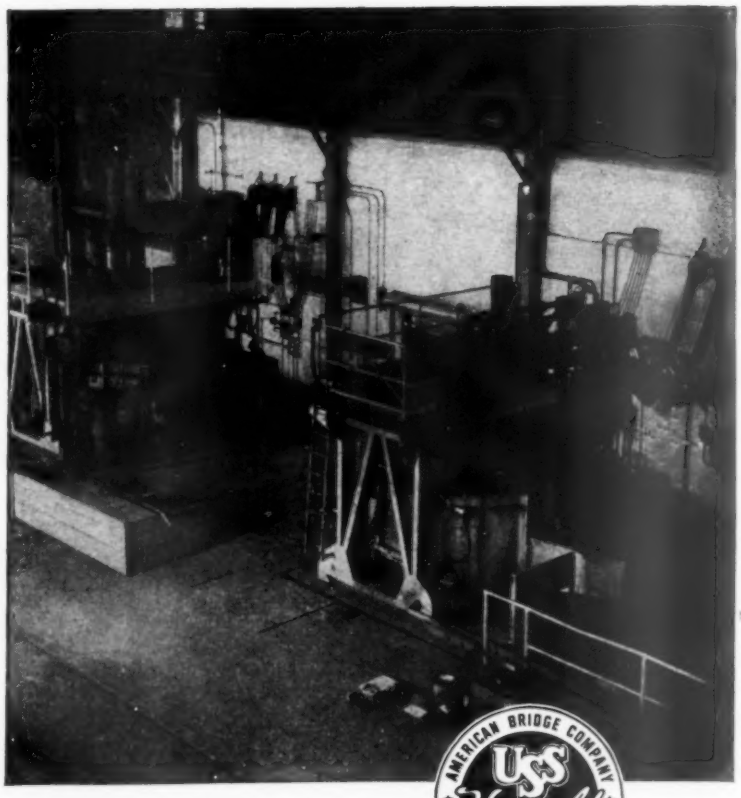

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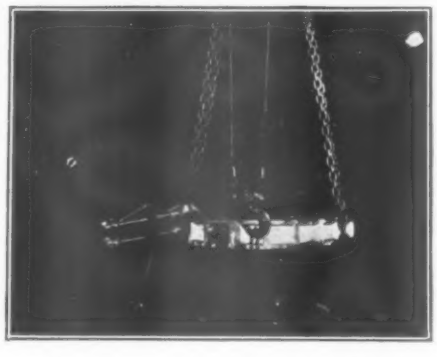

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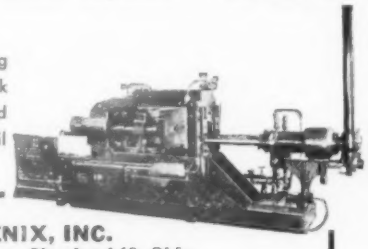

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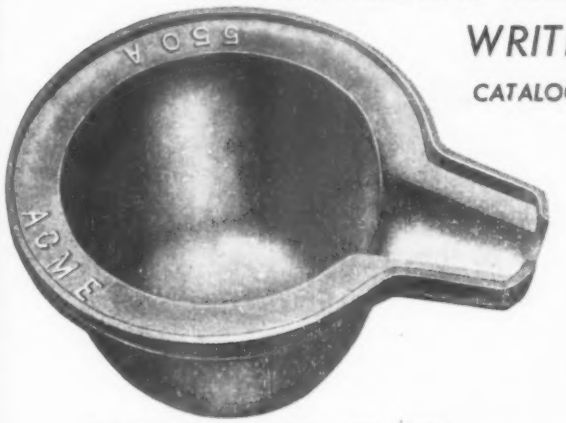

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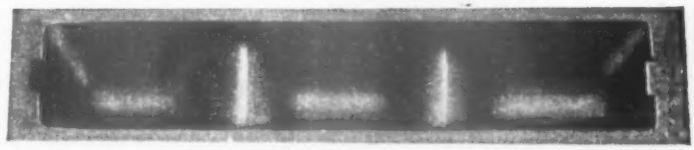

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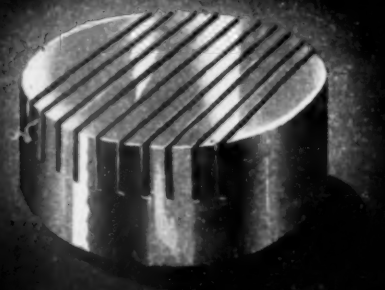

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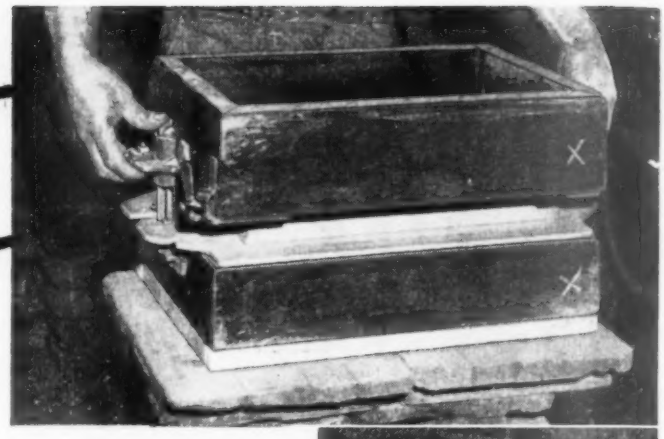

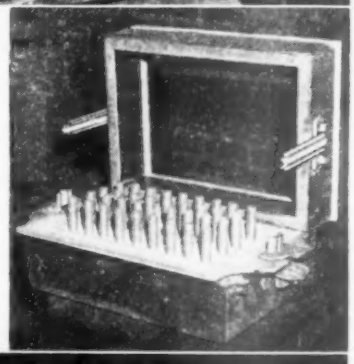

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Being cast, the tungsten-carbide is pure—as is not the case when made by sintering.

The purity of the metal ensures long wear, reduces air consumption and guarantees concentration of the blast—all due to the extremely slow wear of the orifice.

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HELPFUL LITERATURE

NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card

1. Pneumatic Grinders

Cleveland Pneumatic Tool Co.—14-page illustrated bulletin No. 80-A presents descriptions, table of general grinder specifications and blueprint diagrams of Cleco portable pneumatic grinders. Capacities for job requirements are discussed.

2. Protective Goggles

American Optical Co.—4-page illustrated folder No. S-4093 describes A-O 700 rubber-frame protective goggles for protection of worker against chemical and dust hazards. Headband is wide elastic and lenses are made of shatter resistant acetate plastic.

3. Sulphur-Carbon Analyzer

Harry W. Dietert Co.—Illustrated data sheet deals with device for determining carbon and sulphur content of metals, fuels and chemicals. Carbon content of iron and steel can be determined in 2 minutes. Accuracy is within 0.2 percent.

4. Direct Drive Grinder

Vonnegut Moulder Corp.—4-page illustrated folder "Marschke In-Between Grinder" outlines characteristics and operating functions of direct drive fully portable grinding unit. Applications include removing surplus metal from castings, reducing weld seams and clean-up grinding operations.

5. Core Blower

Redford Iron & Equipment Co.—4-page illustrated catalog "The Improved Redford Core Blower" describes core blower for efficient production of small intricate cores. Unit is bench type and operates on from 80 to 120 pounds air pressure. It will blow core boxes of different height, shape or size. Adjustments can be made instantly.

6. Laminated Material

Haskelite Mfg. Corp.—8-page illustrated bulletin No. SC-45 reveals application data on Plymetal laminated material. Material is constructed of light gage metals permanently bonded on one or both sides of plywood core. Its potential uses include manufacture of airplanes, railroad coaches, trucks, doors, street cars, cabinets and many more products.

7. Gas-Electric Power Plants

Power Plants, Inc.—Illustrated data sheet No. MP100 describes gas and electric power plants designed for lifting magnet operation. Ratings range from 3 to 15 kilowatts on 230 volts. Engine, generator and accessories are discussed.

8. Plastic Patterns

Atlas Plastics, Inc.—8-page illustrated folder No. WA 5500 reveals information on plastic patterns, core boxes and match plates used for reproduction purposes. These patterns are not affected by heat, moisture, oil or acids. Smooth castings are said to result.

9. Aluminum Alloy

Acme Aluminum Alloys, Inc.—4-page illustrated folder "Almag 55" deals with Triple-A Almag 55 aluminum alloy that is especially suited for use in large number of hardware, electrical and plumbing fixtures and specialties. Tensile strength, yield point, elongation and resistance are discussed.

10. Industrial Jacks

Duff-Norton Mfg. Co.—40-page illustrated catalog No. 203 contains new information, complete descriptions, data and specifications on complete line of jacks for industrial use. Jacks ranging from 50-ton general purpose screw type to 5-ton all purpose units are covered.

11. Industrial Blowers

General Blower Co.—4-page illustrated bulletin "Lungs for Industry" presents data on complete line of blowing, heating, cooling, conveying, aerating, separating and agitating equipment. Construction features and specifications are included.

12. Materials Handling

Frank G. Hough Co.—8-page illustrated bulletin No. 162 presents loading, carrying and dumping characteristics of model HA Payloader tractor shovel. Illustrations show tractor shovel handling sand, coke, coal and other foundry materials.

13. Grinding Machinery & Wheels

Bridgeport Safety Emery Wheel Co.—16-page illustrated catalog No. 146 presents specifications, characteristics and construction details of horizontal face grinders, vertical surface grinders, knife grinders, floor stand grinders, buffing lathes, cutlery grinders, cut-off machines, special grinding machines and grinding wheels for every foundry application.

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14. Power Drives

Master Electric Co.—Six multipage illustrated catalogs reveal application advantages, construction features and design information on Masterdrive power drive equipment. This equipment is illustrated in wide variety of applications such as on vibrating, grinding, drilling and sawing equipment.

15. Permanent Mold Process

Foundry Div., Eaton Mfg. Co.—18-page illustrated booklet "A Quick Picture of the Eaton Permanent Mold Process for Gray Iron Castings" is comprehensive story of procedure used in preparing molds from drawing board to finished and tested product. Physical and mechanical properties of process are outlined.

16. Pneumatic Tools

Independent Pneumatic Tool Co.—64-page illustrated catalog No. 52-B, second edition, includes data on drills, tappers, screwdrivers, nut setters, grinders, sanders, rivet squeezers, busters, balancers, wrenches, rammers, saws, hoists and riveting, scaling and chipping hammers.

17. Mobile Crane

Unit Crane & Shovel Corp.—4-page illustrated bulletin No. 46-A presents data on Unit 357 self-propelled mobile crane which is quickly convertible to shovel, trencher, backfiller, clamshell, dragline, pile driver or magnet. Dimensional data and general specifications are given.

18. Vibratory Feeders

Syntron Co.—6-page illustrated folder No. 9-46 covers Vibra-Flow vibratory feeders for handling solid materials. Rheostat control of volume is described. Wide range of models is illustrated.

19. Flexible Couplings

Ajax Flexible Coupling Co.—24-page illustrated catalog No. 44 presents data on principle of operation, parts, horsepower ratings, service factors and types of Ajax flexible couplings for wide range of foundry applications.

20. Dust Collectors

Torit Mfg. Co.—24-page illustrated catalog No. 31 covers line of dust collectors which are self-contained units for removing dust laden air around grinding, cutting and polishing wheels. Accessories are described.

21. Welding Electrodes

Alloy Rods Co.—6-page illustrated vest pocket size bulletin No. A6-46 discloses information on Arcaloy electrodes for stainless steel welding. Electrode analysis and color chart is included for easy reference.

22. Movable Partitions

E. F. Hauserman Co.—32-page illustrated catalog No. 46 describes movable steel partitions and wall linings for adapting floor areas to exact requirements of changing functions in offices, factories, laboratories and institutions.

23. Graphite Lubrication

John Mather Lupton Co.—16-page illustrated technical booklet "Colloidal Graphite" describes use of graphite in foundry field for applications such as coating ladles and spraying dies. Fundamental properties are discussed.

24. Cutting Oil

Oakite Products, Inc.—20-page illustrated vest pocket size bulletin No. 5239R deals with soluble oil designed for use in large and small plants for various machining and wet grinding operations on ferrous and nonferrous metals.

25. Aluminum Alloys

Apex Smelting Co.—8-page illustrated bulletin entitled "Apex 50 Alloy" describes aluminum alloy with excellent casting characteristics. It has good mechanical properties, can be heat treated and anodized and is readily machined. It is pressure-tight.

26. Casting Resin

Durez Plastics & Chemicals, Inc.—12-page illustrated catalog "Durez Casting Resin" is technical discussion with full instructions included for use of casting resin No. 7421 A. Material is phenolic thermosetting resin in liquid form, which is used without pressure.

27. Aluminum Welding

Reynolds Metals Co.—88-page illustrated booklet "Welding Aluminum" covers edge preparation, cleaning, preheating, welding flame, fluxes and technique for gas, arc, metal-arc, carbon arc, atomic-hydrogen arc and inert-gas shielded arc welding of aluminum. Price is $1.

28. Grinding Wheels

Blanchard Machine Co.—18-page illustrated catalog No. 240-3M-8 covers grinding wheels for Nos. 10, 11, 16, 18, 16-A, 16-A dual, 16-A-2 and 27 Blanchard surface grinders. Sketches show construction details of wheels. Specifications are included.

29. Core Ovens

Despatch Oven Co.—8-page illustrated bulletin No. 31 presents details of batch type Coremaster foundry ovens. Sizes, specifications, typical installations and advantages of use are covered. Design and construction features are presented.

30. Brass & Bronze Castings

Hammond Brass Works—20-page illustrated catalog "Practical Data on Brass and Bronze Castings" contains chemical and physical specifications of various Hammond bronzes as well as data for use by engineers and designers. Details of company's facilities are presented.

31. Speed Reducer

Falk Corp.—64-page illustrated bulletin No. 3100 deals with Motoreducers standard drives for all requirements either horizontal or vertical. Specification tables and information on how to select proper sizes of these motorized speed reducers are included for reference.

12-46

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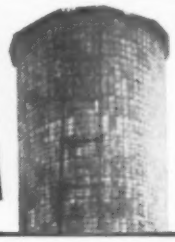

With sand in condition there are fewer defective castings — a loss that really mounts up over a busy year's operations.

With ample dry storage capacity, sand can be ordered in carload lots, cutting cost per ton—also safeguarding you from running short due to strikes, wrecks or failure to reorder in time.

Hundreds of foundries now installing bins, hence our suggestion that you consider bins.

THE NEFF & FRY CO., Camden, Ohio

Neff & Fry Bins of Super-concrete stave type. Also monolithics. Any size you require.

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CORE BLOWER
CORE BOXES

OUR CORE BOXES are carefully engineered to produce sound and durable cores. Special attention is given to the core box design to insure proper blow holes and air release vents. All blowing equipment leaves our shop ready to put on core Blower.

CORE DRIERS are so constructed to withstand rough handling and undue warpage from overheat. Core Driers for stacking to conserve core oven space upon request.

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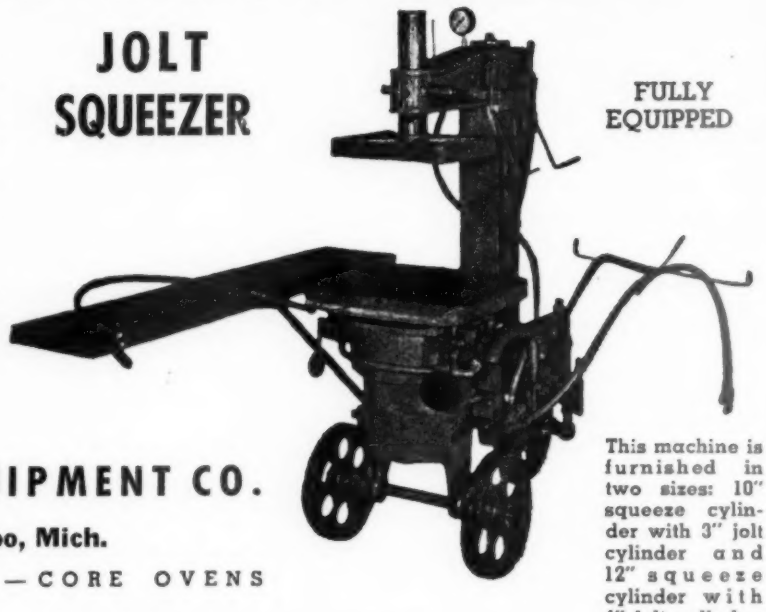
JOLT SQUEEZER

FULLY EQUIPPED

● The post and squeeze cylinder on the HAYNES JOLT SQUEEZER is cast all in one piece. There are no bolts or screws in this machine. The top of the post is machined on top with a 2 7/16" cold rolled shaft which the swing arm swings on.

This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.



This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

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LECO COMBUSTION BOATS

have been designed to withstand temperatures up to 2700° Fahrenheit.

In addition they give you these features:

● Fast preheating because of light weight.

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There is a Leco Combustion Boat to suit your every requirement. Large stocks of standard shapes and sizes are maintained to assure immediate delivery. Special shapes may be furnished upon request.

Compare the Leco boat with any other on the market. We will furnish you free samples for this purpose.

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A COMPLETE encyclopedia, a ready reference and a practical guide to sound foundry practice. In addition to a description of every conceivable type of gate and riser, the text covers the application and function of gates and risers to all sizes and types of castings. Illustrations on almost every page enable the reader to grasp the salient points with a minimum of study.

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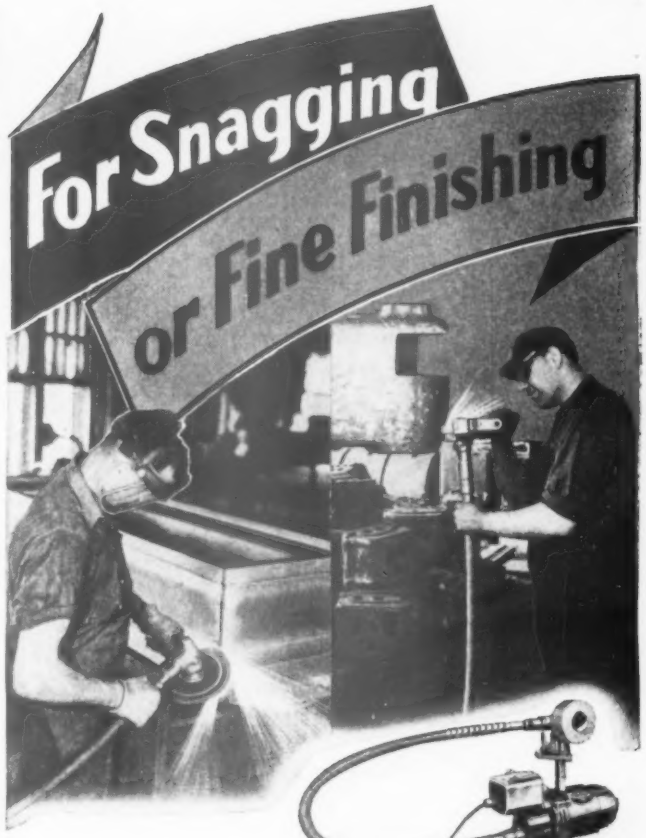

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Mall Flexible Shaft Grinders operate at constant speed with true concentric motion and minimum of gyroscopic force in the working tool. Ball bearing mounted straight and angle spindles combine with flexible shaft to make power available in any position at any angle. Light-weight working tools for Grinding, Sanding, Wire Brushing, Drilling and other jobs are quickly interchanged.

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√Insures Sounder Castings
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BALL BEARING DRESSERS | REVOLVING CUTTER TYPE DRESSERS | DIAMOND HAND TOOLS AND NIBS | WHEEL TYPE DRESSERS | SIMPLEX STEEL-SLIDE VISES

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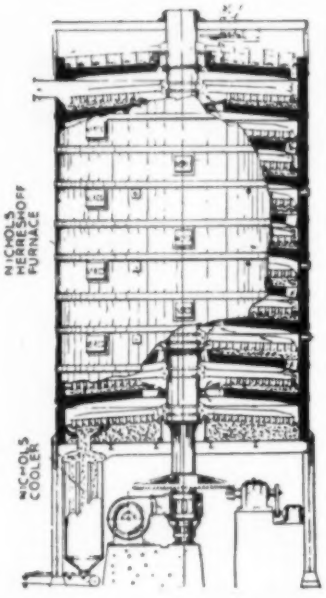

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The NEW PYRO Immersion (illustrated at the right) eliminates spoilage and insures uniform and sound non-ferrous castings. Bare Metal and Protected Type thermocouples instantly interchangeable.

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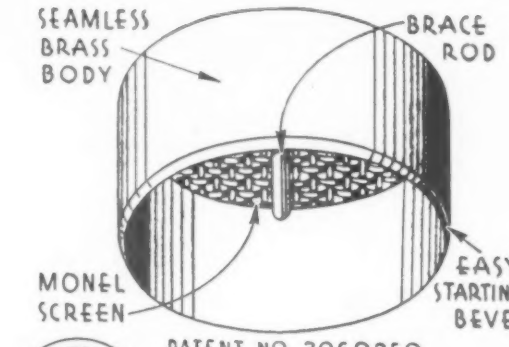

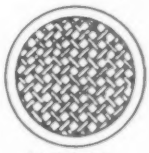
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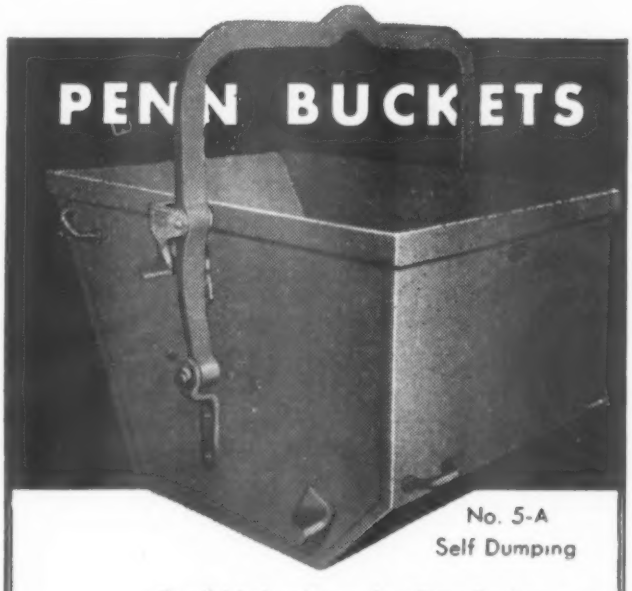

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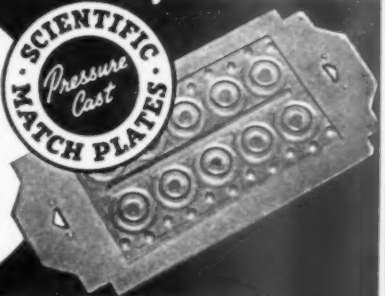

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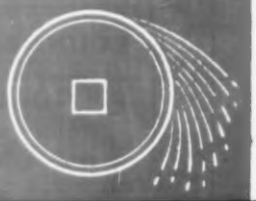

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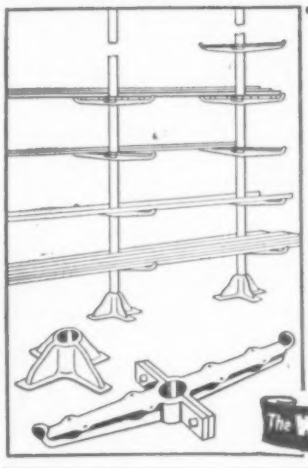

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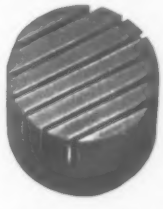
CORE  BOX

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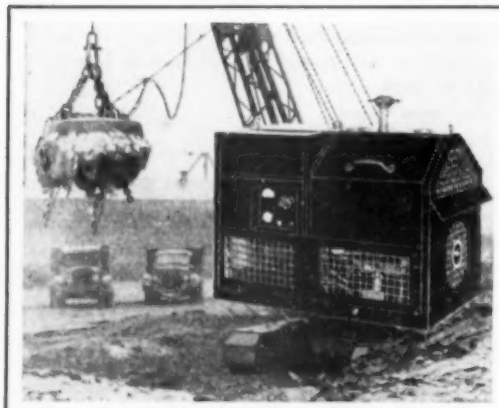

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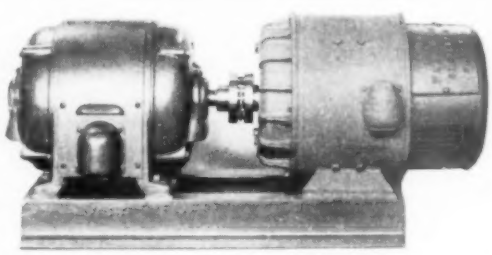

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FABRICATORS (Metal)

Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS

Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St. New York 17, N. Y.
Stevens Inc. Frederic B., Detroit 26, Mich.
United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind
General Blower Co., 406 N. Peoria St. Chicago 22, Ill
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.

FEEDERS (Rotary)

Fuller Company, Catasaqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FEEDERS (Sand)

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, C
Jeffrey Mfg. Co., 907 N. Fourth St. Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON

Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME

Hickman-Williams & Co., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROMANGANESE

Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.

FERROMOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON

Chromium Mining & Smelting Corp. Ltd., Sault Ste. Marie, Ont.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILLET (Cement & Solvant)

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

FILLET (Wax, leather, wood)

PMS Co., 1701 Power Ave., Cleveland 14, O.

FILM (X-Ray)

Eastman Kodak Co., Rochester, N. Y.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FIRE BRICK

Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Stevens Inc., Frederic B., Detroit 26, Mich.

FIRE CLAY

Eastern Clay Products, Inc., Jackson, O.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

FIRE SAND

Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.

FIRESTONE

Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.

FLASK BANDS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

FLASKS (Aluminum)

Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASKS (Dowmetal)

Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASK FILLERS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

FLASKS (Slip)

Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport. Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FLASKS (Steel)

Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Youngstown 1, O.

FLASK FITTINGS

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Truscon Steel Co., Youngstown 1, O.

FLASK LUMBER

Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.

FLASKS (Wood)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

FLEXIBLE SHAFT MACHINERY

Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Strand Co., N. A., 5001 N. Wolcott Ave., Chicago 40, Ill.
Wyzenbeek & Staff Inc., 838 W. Hubbard St., Chicago, Ill.

FLOORING (Non-Slip)

Norton Co., Worcester 6, Mass.

FLUXES

American British Chemical Inc., 180 Madison Ave., New York 16.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Chemical Products Co., 8514 Cedar, Cleveland 6, O.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.
National Pigment Co., East York St., Philadelphia, Pa.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FOUNDRY LAYOUT & METHODS

Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, 120 So. LaSalle St., Chicago 3, Ill.

FOUNDRY NAILS

Capewell Mfg. Co., Hartford, Conn.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLY HOUSES

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Midwest Foundry Supply Co., Edwardsville, Ill.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FURNACES (Aluminum & Magnesium Billets)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

FURNACES (Aluminum & Magnesium Forgings)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Kirk-Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
W. S. Rockwell Co., 56 Church St., New York 17, N. Y.

FURNACES (Aluminum Melting)

Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford. Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

FURNACES (Aluminum Rivet Heating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Despatch Oven Co., Minneapolis 14, Minn.

FURNACES (Annealing)

Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., Harrison, Ohio.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Crucible Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Eclipse Fuel Engrg. Co., 711 So. Main St., Rockford, Ill.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.

FURNACES (Electric Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Greene Electric Furnace Co., 2702 6th So., Seattle 4, Wash.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Forging)

R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.

FURNACES (Gas or Oil Fired)

Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., Harrison, O
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 81, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.

FURNACES (Gas or Oil Fired) (cont'd)

Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
General Electric Co., Schenectady, N. Y.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., 800-320 Moore St., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.

FURNACES (Nonferrous Melting) (cont'd)

Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACE BLOWERS

Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Johnson Fuller Co., 1366 So. Flower St., Los Angeles 15, California.
Ironton Fire Brick Co., Ironton, O.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Nock Firebrick Co., 1245 East 55th St., Cleveland 14, Ohio.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
United States Graphite Co., Saginaw, Mich.

GAGES

Acme Aluminum Alloys Co. Inc., 232 N. Findlay St., Dayton 3, O.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

GAS

American Gas Association, 420 Lexington Ave., New York 17, N. Y.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

GAS BURNERS

Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.

GLUE POTS (Electric)

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Willson Products Inc., Reading, Pa.

GRAPHITE

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.

GRINDERS (Flexible Shaft)

Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.

GRINDERS (Pneumatic Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Co., Grand Haven, Mich.

GRINDERS (Surface, Bench, Disc, Floor)

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Sutter Products Co., Dearborn, Mich.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDING WHEELS—See ABRASIVE WHEELS

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.
Western Tool & Mfg. Co., Springfield, Ohio.

GRINDSTONES

Bay State Abrasive Products Co., Westboro, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co.

GRIT (Abrasive)

Alloy Metal Abrasive Co., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Carborundum Co., Niagara Falls, N. Y.

GRIT (Abrasive) (cont'd)

Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Michigan.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

HAMMERS (Chipping)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Keller Tool Company, Grand Haven, Mich.
Schramm Inc., West Chester, Pa.

HARDNESS TESTING EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Direct Fired)

Despatch Oven Co., Minneapolis 14, Minn.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

HEATERS (Gas, Oil, Electric)

American Foundry Equipment Co., Mishawaka, Ind.
Despatch Oven Co., Minneapolis 14, Minn.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Indirect Fired)

Despatch Oven Co., Minneapolis 14, Minn.

HEATERS (Liquid, Steam)

Johnson Corporation, Three Rivers, Mich.

HEATERS (Space, Unit, Direct Fired)

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

HEATERS (Space, Unit, Oven, Water)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Maehler, Paul Co., 2200 W. Lake St., Chicago 12, Ill.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.

HELMETS (Blasting)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Keller Tool Company, Grand Haven, Mich.

HOISTS (Chain)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

HOISTS (Electric)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Modern Equipment Co., Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

HOISTS (Hand)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
Clipper Mfg. Co., 2800 Warwick St., St. Louis, Mo.

HOSE (Air, Blasting, Water, Gas)

Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

ILLUMINATORS (X-Ray Film)

Eastman Kodak Co., Rochester, N. Y.

IMPREGNATING SYSTEMS

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.

INGOTS (Nonferrous)

Ajax Metal Co., Philadelphia 23, Pa.
Aluminum Company of America, Pittsburgh, Pa.
Aluminum & Magnesium Inc., Sandusky, O.
American Smelting & Refining Co., 120 Broadway, New York 5.
Apex Smelting Co., Chicago, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP RR. Cleveland 13, O.
Federated Metals Div., American Smelting & Ref. Co., New York 5.
General Smelting Co., Philadelphia, Pa.
International Nickel Co., Inc., 67 Wall St., New York City 5.
Jobbins, Wm. F., Inc., Aurora, Ill.
Lavin & Sons R., Inc., Chicago, Ill.
National Smelting Co., Cleveland, O.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, New York.

INGOTS (Nonferrous) (cont'd)

Silverstein & Finsof, Inc., 1720 N. Elston, Chicago 22, Ill.
Souken-Galamba Corp., Kansas City, Kan.
U. S. Metals Refining Co., New York.
U. S. Reduction Co., E. Chicago, Ind.

INJECTION MOLDING MACHINES

Lester-Phoenix Inc., 2711 Church St. Cleveland 13, Ohio

INSPECTION (Cast Metals)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Fluorescent Penetrant)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Magnetic Particle)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSULATORS (for casting heads)

Houghton Co., E. F., Philadelphia, Pa.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
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Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

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American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Norton Company, Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3850 N. Palmer St., Milwaukee 12, Wis.
Sly, W. W., Mfg. Co., 4753 Train Ave., Cleveland 2, O.

SAND BLAST ROOMS
American Foundry Equipment Co. 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.

SAND BLAST ROOMS (cont'd)
Ruemelin Mfg. Co., 3850 N. Palmer St., Milwaukee 12, Wis.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O

SAND BLAST TABLES
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O

SAND CONTROL and TESTING EQUIPMENT
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
National Engineering Co., 549 W Washington St., Chicago 6, Ill.

SAND CONVEYING and HANDLING EQUIPMENT
American Air Filter Co., 266 Central Ave., Louisville 8, Ky
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd. Chicago 9, Ill.
Material Movement Industries, 310 So. Michigan Ave., Chicago 4, Ill.
National Engineering Co., 549 W Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Penn Iron Works, Reading, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

SAND CONVEYING and HANDLING EQUIPMENT (Pneumatic)
Ajax Flexible Coupling Co., Westfield, N. Y.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Fuller Company, Catasaqua, Pa.
Frank G. Hough Co., Libertyville, Ill.
Robins Conveyors Inc., 70 Pine St., New York 5, N. Y.

SAND DRYERS
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Link Belt Co., 300 W. Pershing Rd. Chicago 9, Ill.

SAND ENGINEERING SERVICE
Minco Products Corp., Saginaw, Mich.

SANDING MACHINERY
Delta Mfg. Co., Industrial Division, 620 E. Vienna Ave., Milwaukee 1, Wis.
Oliver Machinery Company, Grand Rapids 2, Mich.

SANDING MACHINERY (Electric Portable)
Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.

SAND MEASURING and WEIGHING DEVICES
Baker Perkins Inc., Saginaw, Mich
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.

SAND MIXERS (cont'd)

Blystone Division
Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

SAND PREPARATION EQUIPMENT

Ajax Flexible Coupling Co., Westfield, N. Y.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Royer Foundry & Machine Co., Kingston, Pa.
Screen Equipment Co., Buffalo, N. Y.
Simplicity Engineering Co., Durand, Mich.

SAND RAMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co., Dayton 1, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Keller Tool Co., Grand Haven, Mich.

SAND RECLAIMERS

Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 60 Wall Tower, New York 5, N. Y.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SAND SIFTING and SCREENING MACHINERY

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Screen Equipment Co., Buffalo, N. Y.
Simplicity Engineering Co., Durand, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SAND STORAGE BINS & GATES

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, O.

SAWS (Band, Metal, Wood)

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAWS (Cold Metal)

Bethlehem Steel Co., Bethlehem, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SAWS (Masonry)

Clipper Mfg. Co., 2800 Warwick St., St. Louis, Mo.

SCALING HAMMERS

Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Keller Tool Company, Grand Haven, Mich.
Schramm, Inc., West Chester, Pa.

SCREENS (Shake-Out)

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Screen Equipment Co., Buffalo, N. Y.
Simplicity Engineering Co., Durand, Mich.

SCREENS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors, Inc., 70 Pine St., New York 5, N. Y.
Screen Equipment Co., Buffalo, N. Y.

SEA COAL

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Midwest Foundry Supply Co., Edwardsville, Ill.

SEPARATORS (Abrasive)

American Foundry Equipment Co., 5505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Johnson Corporation, Three Rivers, Mich.
Jas. A Murphy & Co., Hamilton, O.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Magnetic)

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Dings Magnetic Mfg. Co., E. Smith St., Milwaukee 7, Wis.

SEPARATORS (Magnetic) (cont'd)

National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Robins Conveyors, Inc., 70 Pine St., New York 5, N. Y.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHOT AND GRIT

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Michigan.
Cleveland Metal Abrasives Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Steel Shot & Grit Co. Inc., 39 Warren Ave., Boston, Mass.

SHOT (Peening)

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.

SHOVELS (Power)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

SILICA FLOUR

Ottawa Silica Co., Ottawa, Ill.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SILICON (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON see Pig Iron (Silvery)

SKIMMER BARS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

SKIP HOISTS

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SLIP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SLINGS (Chain)

American Chain Div., American Chain & Cable Co., 230 Park Ave., New York, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

SLIP JACKETS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SMELTERS & REFINERS

American Smelting & Refining Co., 120 Broadway, New York 5.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

SNAGGING WHEELS—See ABRASIVE WHEELS

SNAP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SODA ASH

Hercules Powder Co., 999 Market St., Wilmington 99, Del.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.

SOLDER

American Smelting & Refining Co., 120 Broadway, New York 5.

SPACE HEATERS

Dravo Corporation, Neville Island, Pittsburgh 25, Pa.

SPECIAL FOUNDRY ALLOYS

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPIEGELEISEN

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa
Freeman Supply Co., Toledo 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.

STEEL (High Speed)

Bethlehem Steel Co., Bethlehem, Pa.

STEEL (Structural)
American Bridge Co., Pittsburgh 19, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

STORAGE BATTERIES (Industrial)
Philco Storage Battery Div., Philco Corporation, Trenton, N. J.

STRIPPING MACHINES
Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

TAPER PINS
Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.

TESTING LABORATORIES
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

TESTING (Non Destructive)
Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

THERMOCOUPLES
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

TIERING MACHINES (Power)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TIMERS (Electric)
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TONGS
Industrial Equipment Co., Minster, O.

TOOLS (Pneumatic Portable)
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co., Dayton 1, O.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Keller Tool Co., Grand Haven, Mich.
Schramm Inc., West Chester, Pa.

TORCHES and BURNERS (Acetylene, gas, oil)
Freeman Supply Co., Toledo 5, O.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

TOTE BOXES
Cleveland Wire Spring Co., United Bank Bldg., Cleveland 9, O.

TRACTORS (Gas Powered)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TRAMRAIL SYSTEMS
American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TRAPS (Steam)
Johnson Corporation, Three Rivers, Mich.

TROLLEYS
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK BATTERIES (Industrial)
Philco Storage Battery Div., Philco Corporation, Trenton, N. J.

TRUCKS (Electric-Industrial)
Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio

TRUCKS (Industrial)
Buda Company, Harvey, Ill.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCKS (Motorized Hand Lift)
Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.

TRUCKS (Power Lift)
Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCK WHEELS
Bethlehem Steel Co., Bethlehem, Pa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TUBES (Annealing)
Pressed Steel Co., Wilkes-Barre, Pa.

TUMBLING BARRELS
Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland 2, O.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21 Mich.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Roto-Cast Foundry Equipment Inc., 100 Grand St., Coldwater, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS
Dravo Corp., Neville Island, Pittsburgh 25, Pa.

UNLOADERS (Portable-Gas Electric)
Cleveland Formgrader Co., 6723 Denison Ave., Cleveland, Ohio

VALVES (Air, Water, Steam)
Air-Way Pump & Equipment Co., 405 S. Jefferson St., Chicago 7, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.

VALVES (Adjustable Orifice)
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

VALVES (Blow-off and Cut-off)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, O.
Wm. H. Nicholls Co., Richmond Hill, Long Island 18, N. Y.

VENTILATING SYSTEMS
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Swartwout Co., 1851 Euclid Ave., Cleveland 15, Ohio.

VENTILATORS (Roof)
Swartwout Co., 1851 Euclid Ave., Cleveland 15, Ohio.

VENTS (Core Box)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
Reinacker Industries, 2035 Hilton Rd., Ferndale, Mich.
Sinel Co., 1405 Philadelphia Drive, Dayton 6, O.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.

VIBRATORS
Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Cannon Vibrator Co., 111 Power Ave. Cleveland 14, Ohio.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Martin Engineering Co., Kewanee, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nicholls Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

WARM AIR HEATERS
Dravo Corp., Neville Island, Pittsburgh 25, Pa.

WASH ROOM EQUIPMENT
Bradley Washfountain Co., 2217 W. Michigan St., Milwaukee, Wis.

WAX (Core, Vent, Pattern)
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
PMS Co., 1701 Power Ave., Cleveland 14, O.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

WELDING APPARATUS (Electric Arc)
Metallizing Company of America, 1330 W. Congress St., Chicago 7, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING and CUTTING APPARATUS and SUPPLIES
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

WELDING ELECTRODES (Carbon)
National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Metallizing Company of America, 1330 W. Congress St., Chicago 7, Ill.

WHEELBARROWS
Construction Machinery Corp., Waterloo, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)
Bay State Abrasive Products Co., Westboro, Mass.
Bridgeport Safety Emery Wheel Co. Inc., Bridgeport, Conn.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keystone Abrasive Wheel Co., Carnegie, Pa.
Raybestos Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Macklin Co., Jackson, Mich.
Mid West Abrasive Co., Detroit, Mich.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire)
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BRUSHES
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE NAILS
Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland 4, O.

WOOD FLOUR
Ace Foundry Materials Co., 14611 Fenkell Ave., Detroit 27, Mich.

WOODWORKING MACHINERY
Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

X-RAY FILMS
Eastman Kodak Co., Rochester, N. Y.

X-RAY INSPECTION
Magnaflux Corporation, 5910 Northwest Highway, Chicago 41, Ill.

ZINC
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

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Now calling on foundries and forgings companies to handle complete line of Missouri refractories. Write in detail giving territories now covered, products handled, qualifications, etc. Address: Sales Manager, Chicago Fire Brick Company, 1467 Elston Ave., Chicago 22, Ill.

GRAY IRON
FOUNDRY SUPERINTENDENT

Experienced in production sand slingers, rollover continuous molding units, floor and jolt and squeeze molding. Large established company. Excellent opportunity for right man. State qualifications, age, salary expected and include photograph. Plant location Pennsylvania.

BOX 954
THE FOUNDRY CLEVELAND 13, OHIO

PLANNING AND PRODUCTION ENGINEER

Plant in Southwestern Ohio offers excellent opportunity for planning and production engineer; plant manufactures machines and equipment of welded plate from 16 gauge to 1" plate. Duties would involve production planning and methods control. Prefer man 28 to 40. Give references, previous experience and educational background in first letter. Advise salary expected.

BOX 986
THE FOUNDRY CLEVELAND 13, OHIO

TIMESTUDY ENGINEER

Permanent position for experienced man capable of installing new incentive plans in various departments in foundry. State age, education, experience in detail and salary requirements.

BOX 991
THE FOUNDRY CLEVELAND 13, OHIO

EXECUTIVE FOUNDRY CONSULTANT

Management engineering firm, about to branch out nationally, has need for a mature, thoroughly experienced, top flight consulting foundry engineer. Must have substantial practical experience as well as professional education. Some traveling. Outline in fullest detail your background and special leanings. Replies strictly confidential and no contacts made without your permission. This is an unusual opportunity. Address: Box 963, The FOUNDRY, Cleveland 13, Ohio.

A RARE OPPORTUNITY FOR AN ALUMINUM PERMANENT MOLD MAN

Wanted an experienced aluminum permanent mold man for newly organized cooking utensil factory located in Eastern Pennsylvania. Must have ability to train men and take complete charge of permanent mold foundry. Will give interest in foundry without investment to man of proven ability. State complete qualifications in first letter. All correspondence strictly confidential. Address:

BOX 968
THE FOUNDRY CLEVELAND 13, OHIO

BRASS FOUNDRY FOREMAN

A working foreman to assist Foundry Superintendent in a well equipped production brass foundry; good opportunity for a hustler. State age, experience and salary desired in first letter. Address: Box 192, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

One thoroughly experienced in either Gray Iron, Steel or Malleable Foundry operation who could assume executive responsibility in an established firm making small to medium castings on a production basis. Prefer man 35 to 45 years of age. In replying state age, experience, references and other details. Location——middle West. Address: Box 987, The FOUNDRY, Cleveland 13, Ohio.

WHITE METAL FOUNDRY FOREMAN

Capable of taking charge of casting department. Knowledge of slush and solid casting procedure and permanent mold design. Address: Box 989, The FOUNDRY, Cleveland 13, Ohio.

YOUNG METALLURGIST

Good opportunity with Ohio manufacturer for young metallurgist in brass foundry. Give education, experience and salary expected. Address: Box 965, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY SUPERINTENDENT

Capable experienced gray iron foundryman wanted to plan, layout, staff and operate a new 60 machine molder production foundry to be constructed in Northeastern Pennsylvania. Immediate employment offered. Initial reply basis for interviews to those qualified. Address detailed reply, stating age, education, experience, references and salary desired, to:—

BOX 975
THE FOUNDRY CLEVELAND 13, OHIO

PATTERNMAKER

Best opportunity ever yet offered for a PATTERNMAKER for wood and metal patterns. Must be able to take complete charge of pattern work in a modern brass plumbing valve factory. Must be able to make core boxes for core blowing equipment. Unless you can assume this complete responsibility do not answer. State complete references and experience in first letter. Address: Box 980, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

For a nonferrous foundry manufacturing small castings. Excellent living conditions, good wages and chance for advancement. Growing concern Address: Box 945, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Midwestern Grey Iron Foundry producing heavy Diesel engine and machinery castings requires experienced man with all operations, including estimating. State age, education and experience in detail. Address: Box 988, The FOUNDRY, Cleveland 13, Ohio.

BRASS OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 966, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

For nonferrous production. Mid-Michigan city. Complete charge approximately 25 squeezer, bench and floor molders. Excellent opportunity. State full experience and salary expected in first letter. Address: Box 913, The FOUNDRY, Cleveland 13, Ohio.

PATTERN FOREMAN

Experienced wood and metal pattern maker for position as assistant foreman in department employing fifty mechanics. Excellent opportunity for man who can qualify. Established production foundry with heavy backlog of orders. Write stating qualifications and employment record. Address: Box 984, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Nonferrous. Technical graduate with five to ten years of foundry experience. Age 30 to 40. New York City. Good salary with excellent future. Write stating experience and salary desired. Address: Box 870, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

With diversified experience in gray iron, skilled in modern foundry layout, plant design and mechanized methods; also tooling, machining and materials handling. Give full details regarding age, experience, etc. Address: Box 956, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY FOREMAN

Middlewest Foundry. Normal production 15 to 20 tons daily. Must be able to handle men and direct operation of cupola. Work consists of small castings on squeeze machines and other machine work, together with floor molding. Castings usually running up to three or four hundred pounds and occasionally die blocks weighing one to two tons. Applicants please state salary desired and when available. Address: Box 809, The FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRY EXECUTIVE

By large jobbing foundry. Qualifications as follows: Must have had five or six years of well rounded experience, either malleable or steel, in molding, sand control, pattern design, and core making. Prefer man 30 to 35 years of age. Write fully, age, experience, salary requirements. Address: Box 932, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

To take charge of foundry producing medium size squeezer work. Must understand foundry practice and able to handle help. Good opportunities for hustler. State age, experience and salary desired. Address: Box 933, The FOUNDRY, Cleveland 13, Ohio.

MAGNESIUM FOUNDRY SUPERINTENDENT

Must be capable of taking full responsibility of installation of equipment, planning production and operating foundry making permanent mold magnesium alloy castings. This is a permanent position with a well established company in Texas with a large backlog. Please forward complete personal experience record with references. Address: Box 955, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

First class radiator foundry superintendent. Consideration will be given only to applicants with A-1 qualifications and having at least ten years' experience in this type of work. Give full information as to age, experience, etc. Address: Box 957, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

For plumbing fixture foundry, using 2 Beardsley Slingers. In Pennsylvania, good opportunity. Give full particulars. Address Box 916, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

First class foundry sueprintendent for a foundry employing 300 men producing gray iron castings. Located in New Jersey. Write giving full particulars as to age, experience, references, etc. Address: Box 958, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM OPEN HEARTH OPERATOR

Secondary nonferrous refiners. Midwestern Region. State experience, qualifications, references and wages desired in first letter. Address: Box 967, The FOUNDRY, Cleveland 13, Ohio.

EXPERIENCED CUPOLA MAN

Familiar with Kathabar Process in the manufacture of individual grey iron castings. Splendid opportunity with nationally known concern in Philadelphia area. Address: Box 983, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

A working foreman to assist Superintendent in a small production brass foundry in Los Angeles. Good opportunity for a hustler. State age, experience and salary desired. Address: Box 973, The FOUNDRY, Cleveland 13, Ohio.

DRAFTSMEN AND LAYOUT MEN

With structural experience preferably on foundry conveyor systems. Location in Chicago. Address: Box 961, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Young, for long established grey iron and semi-steel captive foundry. 30 ton daily. Strong on cupola, sand, gating and risering and know how to handle men. South Central Pennsylvania. Address: Box 879, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Help Wanted

SALESMAN OR MANUFACTURER'S AGENT
For Houston, Texas; Milwaukee; Buffalo, New York, to represent Mid-west alloy foundry manufacturing highest quality STAINLESS STEEL AND HEAT RESISTANT CASTINGS, statically and centrifugally cast. Write in detail, giving territory covered, produc'ts handled and types of industries served. Address: Box 921, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

NONFERROUS FOUNDRY MANAGER OR SUPERINTENDENT
McLain Graduate of Milwaukee, Wis. Practical foundryman with many years' experience in aluminum, brass, copper bronze, aluminum bronze and magnesium bronze in jobbing or production in mechanized foundry setup. Understand foundry molding coreroom cutoff grinding and cleaning room and shipping room. A-1 foundryman in marine hardware and plumbing fixtures. Neat appearing and aggressive. Employed as foundry superintendent and engineer. Address: Box 974, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN
Wants to make new connection. Practical experience with technical training and cost minded. Experienced with work ranging from a few pounds to ten ton. Good rigger for production. Understand gray iron metallurgy. Mix iron by analysis. A1 cupola supervision. Capable of handling a foundry organization as top management, assistant to a busy executive or as a foundry superintendent. Middle age. Good personality. Address Box 834, The FOUNDRY, Cleveland 13, Ohio.

AVAILABLE
Foundry and industrial engineer, for modernization, mechanization, surveys, wage incentives, production controls, cost control in grey iron, malleable and steel, on consulting or short term contract basis. Address: Box 813, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT GRAY IRON AND MALLEABLE
25 years' practical and executive experience in producing quality castings in general jobbing and high production automotive castings. Well versed in foundry costs, cupola cores, cleaning, sand control and mechanized foundries. Right connection rather than large salary. Address: Box 101, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST
B. S. Metallurgical Engineering—6 years' experience as foundry metallurgist in charge of nonferrous and ferrous melting, sand control, heat treatment and research. Desire position as chief metallurgist, development or research metallurgist. Address: Box 992, THE FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
Practical foundryman with thirty years of thorough knowledge of all phases of grey iron foundry activities in production ond jobbing foundries. Good record handling union labor. Past eleven years as foreman and superintendent. Address: Box 995, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY EXECUTIVE
Technical education in metallurgy and business administration with an unusual practical background in all classes of light ond medium castings. Experienced in developing stable organizations for improved operations. Qualified record in maintaining excellent employee and customer relations. Address: Box 990, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN
46 years of age wants position in a malleable iron foundry. Has 30 years' experience and is at present employed in a mechanized plant with high production. Expert on gating and has excellent knowledge on problems in malleable iron. Can furnish excellent references. Address: Box 977, The FOUNDRY, Cleveland 13, Ohio.

MELTER
With 20 years' experience on acid, basic and electric furnaces. Understand making of all alloy steel handling of ladles. Willing to go any place. Address: Box 962, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY EXECUTIVE DESIRES
Connection with bronze and/or iron foundry in charge of manufacture or sales. Clear understanding of operations and handling personnel and knows application of metals. Past earnings over $20,000 per year. Sixty days' notice. Address: Box 762, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISION OR CHIEF METALLURGIST
Age 38, graduate degree. Highly recommended. Can produce results. Sound experience in steel, alloys, grey iron, nonferrous. Go anywhere. $500 minimum. Address: Box 998, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN—MALLEABLE
Twenty-eight years with present employer in various capacities. Well versed in all departments, including gating-sand control-mixing of iron by analysis-annealing-heat treating-grinding-finishing and maintenance. Age 50. Capable of assuming full charge of plant. Address: Box 976, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS ENGINEER
B.S. in chemical engineering—three years' experience in foundry research involving foundry metallurgy and chemical engineering principles. Desire development or production work. New England area preferred. Address: Box 946, The FOUNDRY, Cleveland 13, Ohio.

ASSISTANT SUPERINTENDENT NONFERROUS METALLURGIST
B. S. in metallurgical engineering. Three years' experience in foundry research involving foundry alloys, melting, gating, casting and testing. Desire position in development or production capacity. Middle West preferred. Address: Box 904, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER
Engineering graduate—eight years in molding and melting, engineering and supervision, alloy and high strength gray iron. Experience covers jobbing and production, pit, floor, bench, squeeze, rollover and slinger. Address: Box 953, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRYMAN
With wide experience would like job as foreman or superintendent. Middle-age, know how to train and handle men and know the business from core to shipping room. Know metals by mix. Address: Box 971, The FOUNDRY, Cleveland 13, Ohio.

CAST IRON WELDING SPECIALIST
Desires connection with large organization. Will equip shop, train welders, guarantee successful operation. Prefer yearly contract. Address: Box 982, The FOUNDRY, Cleveland 13, Ohio.

PATTERN FOREMAN
Capable of taking over shop. Can handle men and apprentices. General job shop experience both wood and metal patterns. Special castings or production work where best patterns must be built. Experienced on core blowing equipment and rigging gates and risers. Can layout and make first class work in small shop. Want a shop where a day's work is appreciated. Address: Box 981, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS ASSISTANT SUPERINTENDENT
Experienced in sand, chill, centrifugal and plaster mold casting. Some permanent mold work. B. S. Metallurgical Engineering. Age 32. Have made important changes in setup of centrifugal casting machines. Address: Box 994, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER MATURE, CAPABLE, DEPENDABLE
With a record that assures you that he can manage your business energetically and safely and develop its possibilities fully and profitably. Excellent experience foundry, machinery and allied lines. General management established medium-sized business primary objective. Correspondence in confidence. Address: Box 598 The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN
Twenty-four years' practical experience in steel foundry from moulder, foreman to foundry superintendent in general jobbing machine and production. Good rigger on patterns, flasks and mechanized equipment. Address: Box 993, THE FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

STAINLESS AND ALLOY CAST STEEL
ASSISTANT MANAGER AND PROCESS ENGINEER AVAILABLE SOON. EXPERT ON GATING AND RISERING. 22 YEARS OF FOUNDRY EXPERIENCE. EXPERIENCED IN ALL PHASES OF THE MANUFACTURE OF STEEL CASTINGS, WELL VERSED IN FOUNDRY COSTS, CAN INCREASE YOUR YIELD, REDUCE YOUR SCRAP AND IN GENERAL INCREASE YOUR EFFICIENCY AND PROMOTE A BETTER QUALITY PRODUCT. PREFER MIDWEST LOCATIONS. ADDRESS: BOX 897, THE FOUNDRY, CLEVELAND 13, OHIO.

FOUNDRY EXECUTIVE
Twenty five years' experience as foreman, superintendent and manager. Two engineering degrees. Accomplished metallurgist. Intimate unusually wide coverage in grey iron, steel, malleable and nonferrous. Includes mechanized foundries, centrifugal, precision, other special casting methods and design. Broad knowledge rigging for production, risering and sands. Some sales, service and research engineering. Mature, dependable, energetic, capable. Available short notice. Address: Box 102, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR
Graduate engineer—8 years' experience in molding, melting, supervision and plant maintenance. Jobbing and some production work, half pound to eight tons. Pit, floor, bench and jolt squeeze. Address: Box 103, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
$2,500-$25,000
This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

Foundries For Sale

FOUNDRIES FOR SALE

GREY IRON FOUNDRY. Capacity 10 tons per day. Good building. Extra land for expansion. Price $65,000.

BRASS FOUNDRY AND MACHINE SHOP. Has well established business on production items. Opportunity for expansion.

EDWARD H. ZOLL
INDUSTRIAL PROPERTIES THROUGHOUT THE EAST
790 BROAD ST. NEWARK 2, N. J.

FOR SALE
FOUNDRY—Well equipped and situated in progressive agricultural community. Includes building, land, business and a large number of standing orders for castings from manufacturers of agricultural equipment. $12,500 total price. $7,400 down, terms on balance. Address: Box 996, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE
Small foundry in Middle West, equipped for the making of brass, malleable or grey iron. Address: Box 852, The FOUNDRY, Cleveland 13, Ohio.

FOR RENT
23,000 sq. ft. warehouse space—ground floor—RR siding privilege—3 door truck delivery—$600 per month.

810-16 S. DELAWARE AVE.
FU-9 6100
PHILADELPHIA, PA.

Classified Advertising

Foundries For Sale

FOR SALE

Controlling interest in nonferrous foundry located in central Michigan, with standard line of production including bearings and refrigerator compressor parts. Plant modernized, doing international business; ideal location, rail and water facilities. Address: ADAM HOPE CO., 1627 W. FORT, DETROIT 16, MICH., RANDOLPH 3540.

Open Capacity

OPEN CAPACITY

For aluminum castings of all kinds in a modern foundry near St. Louis, Missouri. Address: Box 985, The FOUNDRY, Cleveland 13, Ohio.

IMMEDIATE DELIVERY

New England pattern shop has open capacity due to recent enlargement. Fine workmanship and modern cost cutting methods. All types of patterns. Address: Box 959, The FOUNDRY, Cleveland 13, Ohio.

Capacity Wanted

WANTED

Foundry to make small gray iron castings. Can give contract for 350 to 500 ton first year. Pattern plates furnished. Address: C. G. S., P. O. Box 31, Oconto, Wis.

Accounts Wanted

ACCOUNTS WANTED

Established Manufacturer's Agent covering Southern Illinois, Missouri and Eastern Kansas can handle several more lines of foundry equipment or supplies. Commission basis. Address: Box 978, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVE

Now calling on non-ferrous foundries in the State of Ohio to represent manufacturer of Graphite Crucibles and Refractory Products on a commission basis. Write in detail advising products now handled, qualifications, etc.

BOX 967

THE FOUNDRY CLEVELAND 13, OHIO

Correspondence Course

THE CUPOLA IS THE HEART OF THE FOUNDRY

Turn the searchlight of McLain's System on your cupola. 90c of every dollar is spent before melting begins—but some make it look like 30c by indifferent melting. Are you using the maximum percentage of steel scrap in your castings? If not, why not? The value of the scrap pile lies in the fact it offers you food for thought. Our system is worth the fee as a desk reference. Synopsis free.

McLAIN'S SYSTEM INC.
230 E. NORTH AVE., MILWAUKEE 12, WIS.

Wanted-To-Buy

WANTED

Blower for cupola lined down to 56"-60" to melt 14 tons per hour. 18" x 54" Roots Connersville or equal. Give complete information.

WILLIAMSTOWN FOUNDRY CORP.
WILLIAMSTOWN, NEW JERSEY

WANTED

SAND CUTTER
American Foundry or other make.
Must be in good condition.

THE J. & E. STEVENS CO.
CROMWELL, CONN.

URGENT
WANTED TO BUY

#3 Simpson mixer and 24" wide apron or oscillating conveyor any length. Gravity roller conveyor 18" wide total length 400 feet. Address: Box 934, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Small nonferrous foundry located in Chicago area. Prefer one with pattern shop connected. Address: Box 100, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Eastern foundry installing a new unit requires the following: 600' roller conveyor, six molding machines in a variety of sizes up to 36" x 54", six squeezers, core equipment for making small cores including oven, three machines, mixer, etc., shakeout machine, sand blast outfit for castings up to 54" long, a sand conditioning outfit, three modern pouring devices, one double head grinder for 24" diameter wheels. Must be in good condition and modern. Address: Box 970, The FOUNDRY, Cleveland 13, Ohio.

WANTED TO BUY

One hand-jolt, hand rollover machine for cores small size, also aluminum patterns on match plate for making cast iron pipe fittings such as Ts, Ls, Plugs, Caps, Unions and Reducers from ¼" to 3". Address all replies to: P. O. Box 1622, Memphis 1, Tennessee.

WANTED
SNAP FLASKS
6" Cope 6" Drag

12 x 16	16 x 16
10 x 16	14 x 16
10 x 14	14 x 14
10 x 20	14 x 26
20 x 20	20 x 24

Jackets 10" deep
Industrial Castings Corp.
P. O. Box 166
Beloit, Wis.

GRAY IRON FOUNDRY

Wanted to purchase small gray iron foundry—New York City or Vicinity.

WILLIAM L. BETZ
25 BROAD STREET
NEW YORK 4, N. Y.
WH 4-0525

WANTED TO BUY

U. S. Rotary brass melting furnace #3. Address: Box 966, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Good used Hawley "Schwartz" down draft oil fired brass furnace. No. 2 42 inch. State price and condition in first letter. Address: Box 972, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

MACHINERY WANTED

36" x 48" or 48" x 48" foundry bumper. State make, age, location and price.

BOVAIRD & SEYFANG MFG. CO.
BRADFORD, PA.

WANTED

Monarch or U. S. melting furnace 2000 or 3000 pounds capacity. Forward particulars to Box 964, The FOUNDRY, Cleveland 13, Ohio.

WANTED
SANDCUTTER

American or equivalent type, 48" to 56" Spiral cutting cylinder. Electric (220V, 3-Phase, 60 Cycle) or Gas Powered. Address: ARROW FOUNDRY COMPANY, MONTAGUE, MICH.

WANTED

American airless wheelabrator. State size, age and price. Address: THE RELIABLE BARREL CO., STA. D.—BOX 319, CLEVELAND, OHIO.

Opportunities

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION, C.P.O. BOX 1501, CLEVELAND, OHIO.

BUSINESS OPPORTUNITY

Inventor wants connection with responsible foundry to manufacture recently patented plumbing fixture (300 lbs.). No machining. Architects and building authorities approve indispensable, revolutionary features. Address: Box 997, The FOUNDRY, 16 E. 43rd St., New York 17, N. Y.

For Sale

FOR SALE

Quality castings in brass, bronze and aluminum. Open capacity at the present time. Address: KOKOMO VALVE PRODUCTS COMPANY, INC., 1420 S. UNION ST., KOKOMO, INDIANA.

FOR SALE

53" diameter Gardner horizontal disc grinder with direct connected motor complete. Good condition—$500.00 f.o.b., Griffith, Indiana. Address: Keen Foundry Co., Griffith, Indiana.

FOR SALE

International Type JW stripper. Will take pattern eighteen inches wide—ten inch strip—good operating condition.

CAST METALS CORPORATION
DESHLER, OHIO

FOR SALE

1—Nicholls #11-32 type Heavy Duty Combination Jolt and Power Squeezer Moulding Machine with Pattern Draw—Serial 41022. Like new. Price, $700.00.

WELLS MANUFACTURING COMPANY
1856 MINER STREET
DES PLAINES, ILLINOIS

Classified Advertising

For Sale

FOR SALE

OVERHEAD ELECTRIC TRAVELING CRANES

	TONS	MAKE	SPAN	CURRENT
(1)	10	Shaw Box	40'0"	220-VAC
(1)	10	Northern	60'0"	440-VAC
(1)	10	Champion	86'0"	440-VAC
(1)	15	Shaw	106'8"	230-VDC
(1)	125/25	Morgan	100'0"	230-VDC

ELECTRIC MONORAIL HOISTS

(1)—½-ton American LoHed 230-VDC.

(6)—½-ton Shepards, 230-VDC., 5-HP. motor HIGH SPEED, FL. OP., 30'0" lift.

(1)—1-ton Shepard 230-VDC., FL. OP.

SPECIAL: 7½-ton, 2-motor, cage operated, Shepard 230-VDC., 40'0" lift, enclosed for out door service, hoist 28/70-FPM., Trolley 400-FPM., an excellent hoist for scrap yard service or cupola charging.

ALL ABOVE IN STOCK OFFERED REBUILT & GUARANTEED.

SEND FOR OUR STOCK LIST OF A.C. & D.C. GENERAL PURPOSE, CRANES & MILL MOTORS, ELECTRIC BRAKES & CONTROL EQUIPMENT, MOTOR GENERATOR SETS, TRANSFORMERS, ETC., OF ALL SIZES.

T. B. MACCABE COMPANY
4300 CLARISSA ST.
PHILADELPHIA (40), PENNA.

FOR SALE

USED

INTERNATIONAL MOLDING MACHINE CO.

MOLDING MACHINES

2—24" Type G Molding Machines
Jolt, Rollover, 10" Draw

1—30" Type G Molding Machine
Jolt, Rollover, 10" Draw

1—22" x 26" Type JW Molding Machine
Power jolt, Hand strip

WOLFF & DUNGEY, INC.

P. O. BOX 1196 SYRACUSE 1, NEW YORK

FOR SALE

1—American skip bucket loader, complete with motor. New condition. For American Foundry Equipment 27 x 36 wheelabrator tumblast.

UNITED FOUNDRIES INC.
WYOMING, PA.

CUPOLA FOR SALE

Used #5 Whiting Type B cupola in very good condition. Height 60 feet. Address Box 969, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1—48" Paxton Cupola, less stack, with 1 Roots Blower, Address: Box 960, The FOUNDRY, Cleveland 13, Ohio.

For Sale

CENTRIFUGAL COMPRESSORS AND BLOWERS

5000 cfm @2# Spencer CC with 75 HP 3/60/1750 RPM motor.
1200 cfm Buffalo, 9½ x 7 x 7¼ with 7½ HP, 220/3/60 1750 motor.
800 cfm @11½# American Sirroco blower with 10 HP 3/60/3600 RPM motor.
675 cfm @ 6 oz. Spencer turb. blower with 2 HP 3600 RPM 3/60/440/220 volts.
600 cfm @3# Spencer turb. blower with 10 HP, 1700 RPM motor.
586 cfm @11½ oz. McKee 4 x 4 Blower.
500 cfm @14½oz. McKee 6 x 6 Blower
225-400 cfm @1# Sturtevant CC with 3 HP 3/60/3600 RPM motor.
20¼ x 16¼ x 18¼ Allington and Curtis No. 55 (belt drive).
10½ x 10½ American size 5 (belt drive).
(2) 1100 cfm @1#, 8 x 8 Sturtevant 24" wheel (belt drive).

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND 14, OHIO

Foundry Equipment for Sale

3—Core Machines, hand rollover, Osborn 42
3—Molding Machines, Osborn 602
10—Sanding cabinets, wet water-tube type 5' w x 6' d x 9' h, with 5 H.P. Motor
1—Jeffrey Aerator, #1—30 to 70 ton per hour capacity
1—Screen, revolving, 4' d x 9' L with speed reducer and motor
1—Screen, vibrating, Tyler Model 27 3' x 5'
6—Furnaces, melting, Hausfeld
10—Furnaces, melting, Bellevue

BOHN ALUMINUM & BRASS CORPORATION
1400 LAFAYETTE BUILDING
DETROIT 26, MICHIGAN

EQUIPMENT FOR SALE

One Simplicity shakeout machine, model SS nearly new. Size 5 foot x 3 foot, complete with 3 HP motor. Cost new $2250, reduced to $850 Address: Box 979, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Immediate Delivery

Excellent condition. Available for inspection at our plant.

7½ Ton Northern Crane 26' 7½" span with runway 123' long

1—84" cupola with #9 Sturtevant Blower

Geared ladles—one 1½ ton—one 2 ton—one 4 ton —one 15 ton—two 25 ton capacities

1—P & H bucket

3—Mold oven doors 20' 10" x 11' 4¼", 14'9" x 19' 5", 14' 9" x 13' 10"—4¼" thick

Air rammers and chipping guns

LAKE ERIE ENGINEERING CORP.
BOX 68, KENMORE BRANCH
BUFFALO 17, N. Y.

For Sale

REBUILT EQUIPMENT IN STOCK

Molding Machines

1—Plain Jolt 36" x 48" Table 12" dia. cyl.
1—Plain Jolt 42" x 60" Table 17" dia. cyl.
1—Plain Jolt 48" x 72" Table 14" dia. cyl.
1—Arcade Modern No. 2-38 Portable or Stationary Hand operated Squeeze Rollover Draw with swing out table.
5—Mumford 3" cyl. Core Jolt with 20" x 15" table.
5—Tabor Air Jolt, hand rollover, hand draw molding machines, 20" x 22" table, 10" draw.

Metal Melting Equipment

New 32" to 41" dia. shell cupolas made to order.
1—Hausfeld Tilting Crucible Aluminum Furnace 33" dia. shell. Gas or Oil.
2—Hausfeld Open Flame Tilting Brass Furnaces 400 lbs. cap. Gas or Oil.
2—Monarch-Rockwell Rotating 500 lbs. brass. Oil.

Blowers for Cupolas and Furnaces

Maxon-Premix Blower Sets for Gas ⅛ to 1 H.P. Motor Driven Centrifugal blowers to 2 lbs. press. Belt Driven Centrifugal blowers for Cupolas.

Tumbling Mills and Sand Blast

1—Pangborn 8 ft. dia. table Rotoblast Type LF complete with sand elevator and screens.
1—Battery of two 24" x 40" Round Tumbling Mills on common stands. Exh. connections.
1—Battery of two 24" x 40" Square Tumbling Mills on common stands. Exh. connections.
1—2000# Cap. V-Bail Worm Geared Crane Ladle.
1—Barrel Type Magnetic Separator—AC driven with DC generator.
3—Portable Sand Blast generator tanks 500 lbs. sand capacity.
1—4000 lbs. cap. Tilting Crane Ladles, V-bail, worm geared.
1—Approx. 8 cu. ft. cap. tilting trough type sand mixer.

Air Compressors 1 to 60 H.P.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

1—#610 Clearfield sand muller complete with motor and control 220V and 440V. Almost new.

1—#2045 Osborn Rollover unit with #136-2 Rollover and Drawer.

1—Core oven 12 ft x 8 ft gas fired double compartment, doubling swing doors on 5 ft. openings, racks, Foxboro controls and Wheelco Flamitrol. Ready for assembly.

2—Young Bros. single compartment batch type electrically heated aging ovens (to 650°F) 8 ft. x 9 ft. x 8 ft. Foxboro controls and recorder. Lift racks, accessories, etc. Ready for assembly.

1—Osborn #91 core blower.

FOUNDRY LEASING CORP.
68 CLIFFORD ST.
NEWARK, N. J.

REBUILT EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed.

HAYNES FOUNDRY EQUIPMENT COMPANY
814 ADA ST. KALAMAZOO 21, MICH.

FOR SALE

One Pangborn No. 1 sand blast room complete with tank, separator, hose, etc. Room size 9' x 9' x 7'-6". Priced for quick sale. Must be moved at once.

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OSWEGO, N. Y.

Classified Advertising

For Sale

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1-Ton
Whiting 33′ Span
Curtis 24′ Span
1½ Ton
Shepard Niles 25′6″ Span
P & H 34′ Span
2-Ton
Louden 19′2″ Span
Box 36′9″ Span
Detroit 28′ Span
3-Ton
Shaw 33′ Span
P & H 25′ Span
Northern 22′ Span
Manning, Maxwell & Moore 48′¾″
"Conco" 48″ and 26′6″ Spans
5-Ton
Whiting 47′4″ Span
38′10½″ Span D.C.
Northern 30′9″ Span
Milwaukee 70′ Span
Milwaukee 66′9″ Span
Manning, Maxwell & Moore 70′ Span
Manning, Maxwell & Moore 47′4″ Span
Shaw 36′ Span
Champion 37′6″ Span
American 70′ Span
American 47′4″ Span
6-Ton
P & H 77′ Span
American 77′ Span
7½-Ton
Shepard 36′ Span
10-Ton
Shaw 68′ Span
Shaw 73′ Span
P & H 30′ Span
P & H 87′6″ Span
P & H 80′ Span
Northern 71′10½″ Span
Northern 60′ Span
Morgan 55′6″ Span
Morgan 39′5″ Span
Morgan 52′3″ Span
Milwaukee 66′9″ Span
McGill 85′ Span
Lane 50′ Span
Emsco 75′ Span
Dominion 35′ Span
Cleveland 38′1½″ Span
Cleveland 50′ Span
Alliance 71′10½″ Span
Alliance 58′9″ Span
Albany 60′ Span
15-Ton
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Northern 53′ Span
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Chesapeake 55′6″ Span
Case 51′ Span
20-Ton
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P & H 51′4″ Span
Northern 60′ Span
Morgan 60′ Span
Cleveland 65′ Span
25-Ton
Whiting 106′ Span
Tysaman 60′ Span
P & H 70′ Span
Morgan 52′3″ Span
Cleveland 106′ Span
Case 63′ Span
Bedford 50′ Span
30-Ton
Whiting 80′ Span
P & H 80′ Span
P & H 60′ Span
Morgan 30′ Span
Case 41′ Span
35-Ton
Bedford 50′ Span
Northern 22′ Span
50-Ton
Shaw 95′ Span
Shaw 69′10″ Span
Dominion 80′ Span
Cleveland 71′10½″ Span
75-Ton
Morgan 59′2½″ Span
Alliance 78′ Span
Alliance 37′ Span
80-Ton
American 40′6″ Span
125-Ton
Morgan 100′ Span
150-Ton
Whiting 30′ Span
175-Ton
Morgan 54′ Span
200-Ton
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Also centrifugal blowers.

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1 10-ton Northern Overhead Foundry Crane, 50 ft. span, 215-230 Volts DC with generator set.
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1 Herman Jolt Rollover Machine, Size 40″ x 72″.
3 Core Oven Cars, apprx. 6′ x 9′ for 58″ Gauge Track.
9 9″ I-Beam Jib Cranes—Can be fastened to columns.
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1 Crane Ladle, 38″ Deep, 41″ Diameter at Top, with Bail.

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ANDERSON, INDIANA

FOR SALE

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1—Modern cylindrical type pouring ladle 2500# capacity. Complete with movable cover and toggle arms. No stationary cover section.

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37 cast steel flasks size 24x25″x8½″ drag and 41 11″ cope. Pin centers 27½″. Also pattern equipment which produces these flasks. Write: DIAMOND T MOTOR CAR COMPANY, 4401 W. 26 h STREET, CHICAGO 23, ILLINOIS, ATTENTION: MR. W. A. BREINIG.

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One SCREENERATOR like new, $350.
One five-drawer type CORE OVEN, oil fired, complete with oil burner. Used 10 months, $650.

BOX 999

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

One No. 8 Buffalo blower equipped with Timken bearings. Price upon application.

THE C. I. CAPPS CO., INC.
P. O. BOX 3335
JACKSONVILLE 6, FLA.

FOR SALE

Demmler Core Blower, #4E, 50″ wide, 52″ high clearance area — NEW — complete with sand elevator.

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HILLSIDE, N. J.

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*Purchased new 1944.

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CLIFTON, N. J.

FOR SALE

SENECA FALLS 4″ LO SWING PRODUCTION LATHE
VERY LOW PRICE on this powerful high production lathe. 60″ centers; geared head; 9 speeds on carriage, 6 speeds on spindles; 8 tools and cross slides; 5 h.p. 3 ph. AC motor; hardened steel ways and gears. For work on heavy steel forgings; does several operations at one time.

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DETROIT, MICH.

FOR SALE

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FOR SALE

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Never used, American Foundry Equipment Co., Rotary Type Sandblasting Machine, 2 nozzle sp. heavy duty sandblast cabinet, 250 cu. in. a minute. Complete with shot separator, dust collector. Original cost $7,500.00 complete F.O.B. Denver, Colorado $2,500.00. Address: Manufacturers Foundry Corp., 3434 Brighton Blvd., Denver, Colo.

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1—Ransohoff Water Mill 36 x 60 side loading and end loading. Automatic star separation and star return. Complete with direct drive and in good condition.
1—405 Osborn Jolt Roll-over pattern draw; jolt cylinder 12″ dia. Pattern draw 18″ max. flask limit 64″.
1—46″ dia. x 56″ inside length tumbling barrel.
1—Battery of four 24″ x 54″ tumbling barrels.
2—30″ x 52″ tumbling barrel only.
1—30″ x 38″ tumbling barrel only.
4—18″ x 52″ tumbling barrel only.

BOX 635

The FOUNDRY CLEVELAND 13, OHIO

LIQUIDATION SALE

BY PUBLIC AUCTION

at the direction of the Board of Directors

OF

NATIONAL ALUMINUM CYLINDER HEAD CO.

WE WILL ON

TUESDAY, DECEMBER 10, 1946, AT 10 A. M.

offer for sale by PUBLIC AUCTION on the premises, 88th and Laisy Streets, Cleveland 14, Ohio

$1,500,000 WORTH OF VALUABLE REAL ESTATE, FOUNDRY MACHINERY, EQUIPMENT AND SUPPLIES. BATTERY OF INGERSOLL-RAND COMPRESSORS, HUNDREDS OF MOTORS IN ASSORTED SIZES AND THOUSANDS OF OTHER ITEMS TOO NUMEROUS TO MENTION

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ROSEN & COMPANY

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Jackson Iron and Steel Company

Is happy to extend to you

Season's greetings for the

Coming New Year

Of 1947

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Andrew Jackson
to the Congress

"Providence, I am sure, watches with peculiar care over the destinies of our Repub ic, and on the intelligence and wisdom of our countrymen. Through His abundant goodness, and their patriotic devotion, our liberty and Union will be preserved."

JISCO BLAST FURNACE SILVERY PIG IRON

THE JACKSON IRON & STEEL Company
JACKSON, OHIO.

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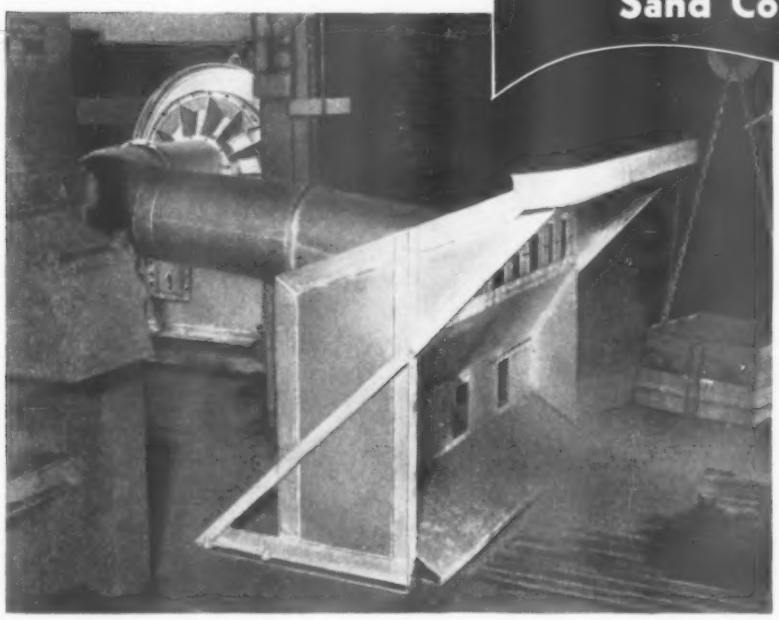
This specially designed AAF shakeout hood served by Roto-Clone combined exhauster and dust separator is typical of many in general foundry use thruout the nation.

A RECENT ROTO-CLONE Shakeout Hood and Sand Conditioning Installation



AAF-engineered side hoods exhausted by Type W (wet) Roto-Clones offer the most practical method of dust control for large shakeouts served by overhead cranes. The strong indraft of the Roto-Clone diverts the dust and fumes and prevents their dispersion to the surrounding work area. Equipment does not interfere with the operation of the shake-out crane and requires a minimum of space and piping to collect, precipitate and store the dust.

Roto-Clones are available in both wet and dry types for every foundry dust control problem occasioned by screens, mullers, tumbling mills, blasts, grinders, in addition to the operations illustrated.

The Type W Roto-Clone shown here collects the fines from the sand and deposits the resulting sludge in the disposal truck below.

The type W Roto-Clone affords effective control of dust from sand conditioning equipment and at the same time insures uniform permeability of the molding sand by exhausting the required amount of fines.

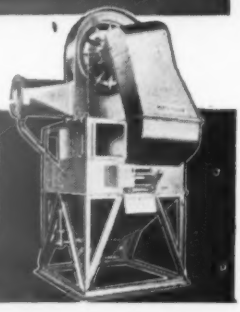
The advantages of compact design and the adaptability of the Roto-Clone to overhead installation where floor space is limited are evident in the installation illustrated. Send for free Roto-Clone Bulletins . . . there's no obligation.

AMERICAN AIR FILTER COMPANY, Inc.
Incorporated
266 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

AAF

MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

Roto-Clone is a registered trademark for a dynamic precipitator or hydrostatic baffle-type wet collector



ROTO-CLONE
FOR FOUNDRY DUST CONTROL

FROM MODERN EQUIPMENT CO. REPRESENTATIVES

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Canadian Foundry Supplies & Equipment, Limited
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Los Angeles 11, California

F. T. Crowe Corporation
218 Walker Building
Seattle, Washington

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Buffalo 14, New York

W. W. Drissen
7238 Hamilton Blvd.
Detroit 2, Michigan

W. C. Edgar
Oliver Building
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Mayer & Oswald, Inc.
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Houston, Texas

McVoy Hausman Company
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Minnesota Supply Company
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Chattanooga 2, Tennessee

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Improved Bottom Pour Ladles • Metal Pouring Systems • Crane & Monorail Systems
For Metal & Mold Handling • Furnace Charging Cranes • Electric Mold Skin Driers

MODERN EQUIPMENT CO.
PORT WASHINGTON, WIS.
DEPT. 184

ONCE AGAIN WE TURN THE PAGES OF TIME
TO EXPRESS OUR DEEP APPRECIATION OF THE
CO-OPERATION OF OUR BUSINESS FRIENDS
AND ASSOCIATES . . . TO ONE AND ALL
GO THE VERY BEST WISHES OF ALL OF US AT

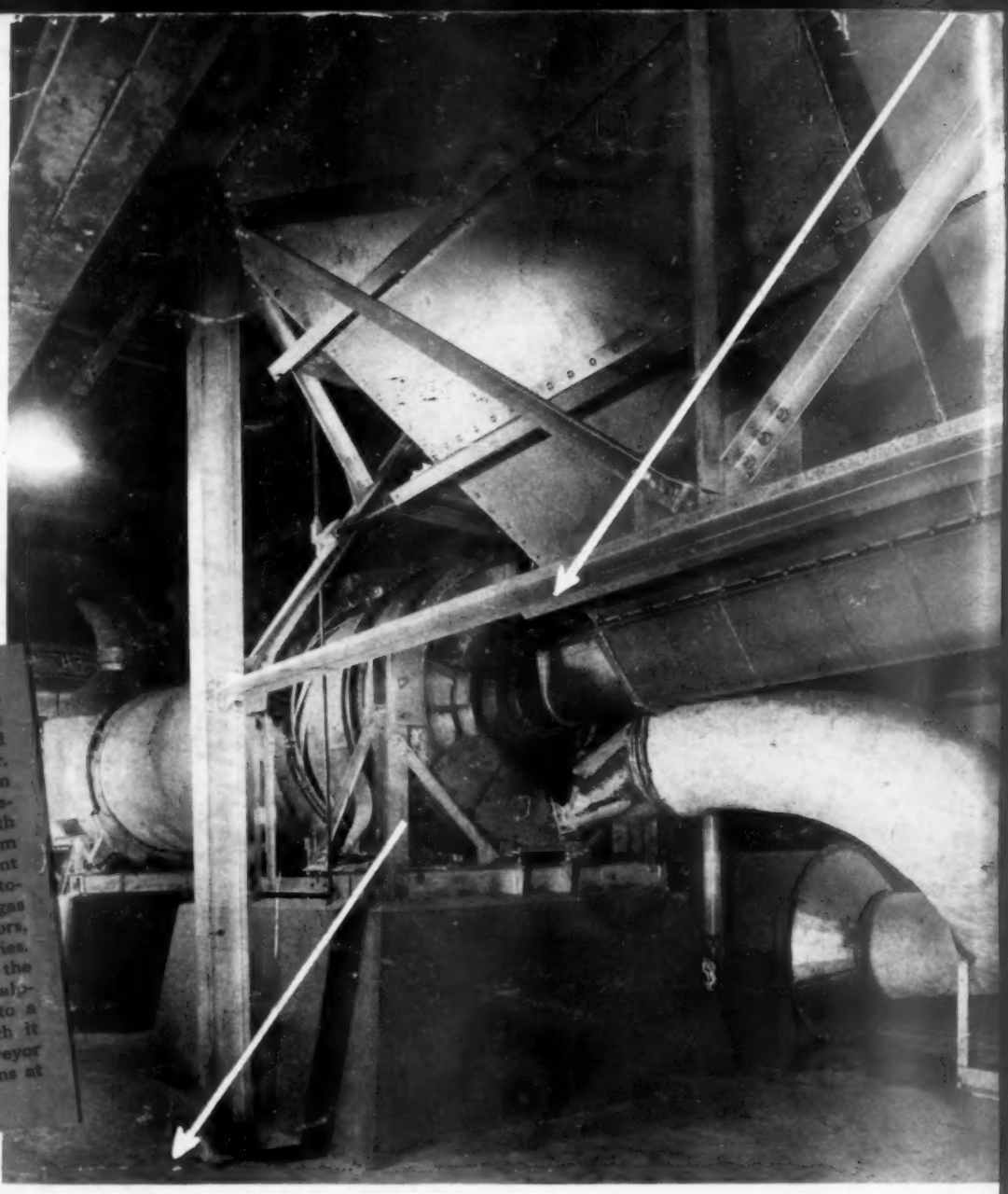
FREDERIC B. STEVENS, INC.

FREDERIC B. STEVENS INCORPORATED

DETROIT 26, MICHIGAN

- NEW ENGLAND . . 166-182 Brewery St., New Haven, Conn.
- NEW YORK and PENNSYLVANIA . . 93 Stone St., Buffalo, N. Y.
- INDIANA . . Hoosier Supply Co., 36 Shelby St., Indianapolis, Ind.
- CANADA . . FREDERIC B. STEVENS OF CANADA, LIMITED
- 1262 McDougall St. . . . . Windsor, Ontario
- 2368 Dundas St., West . . . . . Toronto, Ontario

DRY SAND FOR UNIFORM MIXING



This Link-Belt Roto-Louvre Dryer and other equipment was installed for drying core sand at the rate of 10 tons per hour. Material enters into the system with approximately 5% moisture and is discharged with approximately 1% maximum moisture. Drying equipment consists of the Link-Belt Roto-Louvre Dryer unit with a gas fired furnace, dust collectors, fans and other accessories. Sand is discharged from the dryer through a vibrating sculping screen which delivers to a bucket elevator from which it is transferred by belt conveyor to the dry sand storage bins at a temperature of 110° F.

ROTO-LOUVRE DRYER
Assures Accurate Uniform Control

THE unique principle on which this dryer operates, enables it to dry core and molding sands at highest efficiency. Many units are now operating in foundries both as dryers and coolers. 8 standard size units for capacities from 1 to 60 tons per hour. Send for Book No. 1911A.

SMALL SPACE—LARGE CAPACITY

This unit often requires less than 50% of floor space and frequently less steel per pound of evaporation than conventional-type drying equipment of comparable quality.

LOW MAINTENANCE

Built for long, continuous service. There are no moving parts within the dryer shell—nothing to get out of order and practically no wear from the abrasive action of material. Gently tumbles and mixes the sand—no sliding. From drive to discharge, this unit is built for trouble-free operation.

COOL DISCHARGE

No overheating—sand is discharged at 120° to 135°F., with a moisture content of zero to ½ of 1%.

EQUALLY EFFECTIVE AS A COOLER—The very same features which make it so outstanding as a dryer also enable this unit to perform with unusual ability as a cooler. Maximum cooling capacity is provided in small space.

LINK-BELT COMPANY Chicago 9, Philadelphia 40, Indianapolis 6, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Seattle 4, Los Angeles 33, Toronto 8. Offices in principal cities.

10,500

LINK-BELT *Sand Preparation* **EQUIPMENT**

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